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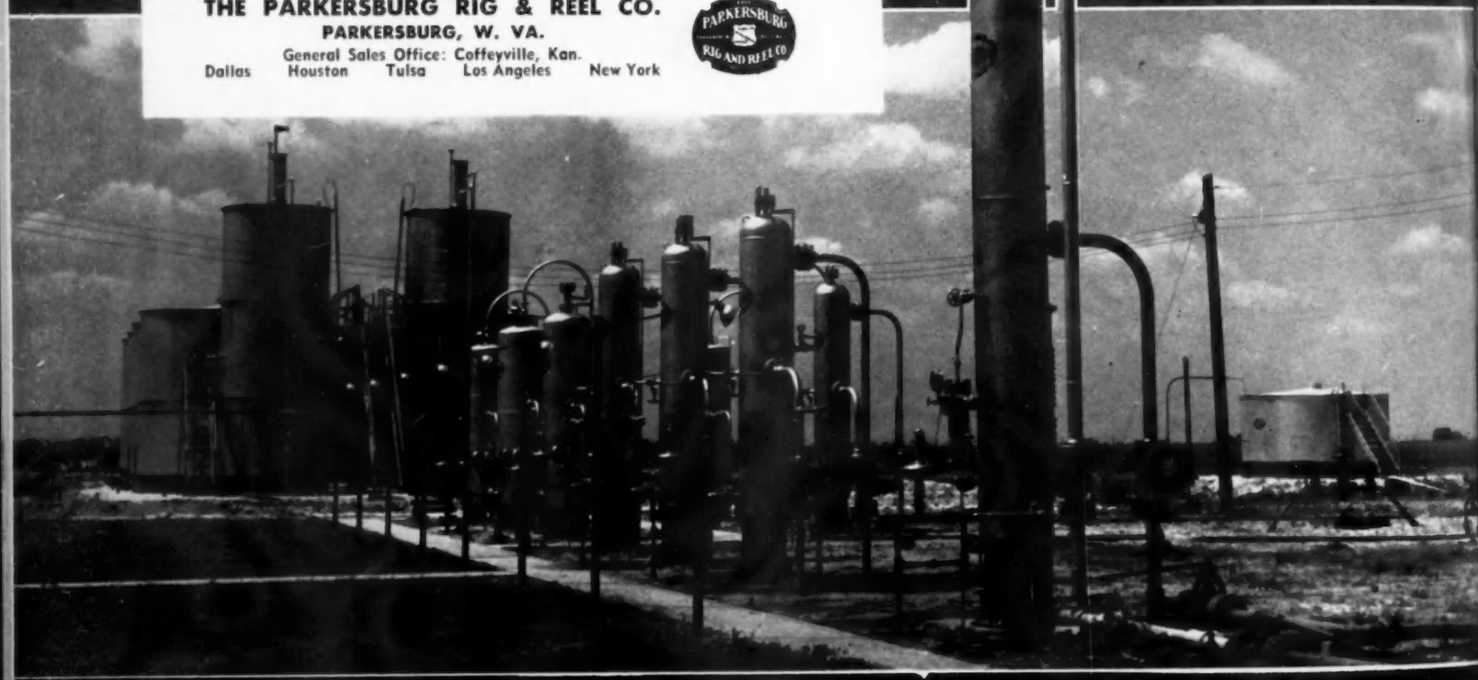

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PETROLEUM REFINER and The REFINERY CATALOG for the refining-natural gasoline industry

THE OIL WEEKLY

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Contents • January 10, 1944

Volume 112, No. 6

The Changing Panorama 9

Technical and Feature Section:

Petroleum Reservoir Efficiency and Well Spacing 11

Farmer Cooperation Relieves Oil Field Labor Shortage 13
BY F. R. COZZENS

Relationships Between Price, Exploration Activity and Petroleum Discovery Volume, Part 2 15
BY E. E. ROSAIRE

Determining Probability of Success of Secondary-Recovery Operations, Part 9 21
BY WILLIAM L. HORNER

Non-Metallic Core in Storage Reel Extends Life of Welding Cables 35

Practical Operating Hints for the Production Man 32

News and Departments:

Looking Ahead with the Editor 7
Washington Roundup 37
Markets, Statistics and Prices 43
International Developments 46
United States Field Operations 47
United States Well Completions 53
United States Wildcat Starts 59
Squeaks from the Bull Wheel 60
Notes for the Equipment Buyer and User 62
Men in the Industry's News 64
Index to Advertisers 64

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LOOKING AHEAD
. . . with the Editor

CONSIDERABLE success is being experienced in pulling inner strings of casing from producing wells on the West Coast. The work is carried on without damage to producing formations. In one instance, a recovery program started last year already has netted about 500,000 feet of casing, and from 40,000 to 50,000 feet are being reclaimed each month.

A forthcoming article will explain the method being used.

Teardrop cars—houses of glass and plastic are not even dreams to these people!

COURTESY NATIONAL WAR FUND

AMERICA'S postwar prosperity with employment and earnings of all who want to work, will not come from grandiose schemes of a helicopter in every back yard and every citizen happy in an ultra-modern metal and plastic home magically erected over night.

Those things may someday come true, but the *immediate* job for a postwar America will be producing to provide for the grim realities that will be faced by millions of peoples in devastated countries; it will be producing staple materials and consumer goods that folks in our own land have done so long without.

Of course, industry shall take every advantage of new materials, new techniques and processes. Up-to-date machines will be needed, too.

Surprisingly, thousands of plants in this war period *have not modernized* their metal turning departments. A lot of war production is coming off machines that were old at the start of the war. Much machinery is wearing out under constant, non-stop usage. Thousands of plants which reconvert from war work, will find their present production line machinery worn out, obsolete or inadequate.

It is estimated that major industries in the United States after the war plan to spend in excess of 2¼ billion dollars for reconversion and modernization. Start planning now—don't be handicapped in postwar competition by "too little and too late".

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The Changing Panorama

Greatest Wildcatting Year Is in Prospect

POLITICIANS and other critics of the oil industry who have accused it occasionally of putting profits above patriotism, are due for a shock when the drilling plans for the industry in 1944 are finally made public. These plans will show that despite operation of many properties at a loss, the industry is meeting the challenge put to it by the government and the emergency confronting it.

Work which THE OIL WEEKLY staff is now engaged in, that of preparing a forecast on drilling operations for 1944, has brought to light some interesting things. To begin with, as preliminary figures come in on wells drilled in 1943 it now appears that THE OIL WEEKLY's drilling estimate for 1943, published in the Annual Yearbook-Forecast and Review Number last year, was better than 99 percent accurate.

And replies now coming in from oil companies from all over the United States indicate plans for a 1944 drilling campaign even greater than that anticipated by the Petroleum Administration for War. While it is too early to offer any definite figures—they will be presented in the Yearbook-Forecast and Review Number of January 31—it is apparent that the American oil business is going into the greatest wildcatting year in its history, and that even the high goal for wildcats set by PAW may be exceeded in the plans oil companies are making.

Sees U. S. Dependent On Foreign Oil

UNLESS those who "control and can correct" its weaknesses are made to realize the real significance of the present situation in the oil industry, the United States faces the post-war prospect of operating its automobiles, trucks, tractors and furnaces with fuel from wells in Canada and the Caribbean, in the opinion of Professor Roy L. Six, geologist of Oklahoma A. and M. College. He sees the United States as a "have-not" nation regarding oil supplies within a few years, for lack of a realistic policy applied to the problem of finding and developing more major oil fields here. The solution of the problem, he points out, lies not with oil geologists, but with government and business, to provide a greater profit incentive, the required manpower, adequate supplies and equipment to get results.

He says that the public is mystified concerning petroleum and the lack of it, as a result of contradictory statements by petroleum executives and government officials, and does not know what to believe. The problem must be brought home to the consumer, he asserts, and an informed public must be aroused and become articulate in its demands that something constructive be done to reverse the trend in the industry. If the authorities are determined not to agree as to the true situation and what is to be done, then the public must insist on the truth and immediate action.

PAO 11 Restrictions Relaxed by PAW

LIFTING and revision of several restrictions of PAO 11 (page 37) will not result in any material increase in drilling, but will relieve some red tape for specified operations and will provide greater operating flexibility.

The order especially encourages dual completions and recompletion work, by permitting wells to be plugged back or deepened. Flexibility in spacing is provided by relaxing of these restrictions to a small extent. Exceptions for work of this nature have been granted freely by PAW in the past, but it will no longer be necessary to request approval except in a few instances.

Pumping operations will be improved,

The War At Home

THOSE who have said that America is soft, that her men can't take it, should have an opportunity to study the attitude of men who have been called to leave homes, families and good jobs, to take up arms for their country. Almost invariably their spirit is "My country needs me—it has called me—and now I am going to do the best damned job it is possible for me to do."

The peculiar thing about a few of these men is that they do not seem to realize that before they are called into service in a uniform, they are fighting their country's battles through the production of those things absolutely necessary to win the war.

Take the men working in the oil fields as an example. The oil country has furnished some of the best fighters in the armed service. They have been in the thick of things all over the world. Most of those who stay at home realize that they are a part of a mighty effort to supply the oil to fly the planes and to run the ships, tanks, trucks and other power equipment. But we are ashamed to say that among those who have not yet donned uniform, there are a few who either do not realize that their part in the oil battle at home is tremendously important, or who do not care.

Stories have come to us of men who loaf on the job when their best efforts are needed in the work of producing oil. We have been told of men who flatly refuse to perform some of the duties ordinarily a part of a drilling crew's assignment.

Fortunately, the percentage of such men is small. Fortunately, the new men who are coming into the oil fields to do the work left by the men now with the armed forces, are willing to do the best they can. Fortunately, they are eager to learn.

Nowadays, most of us have members of our families in the armed forces. Some of us have already lost loved ones. All of us are under the fear that tomorrow will bring a telegram from the Army or Navy advising with regret that a loved one has made the supreme sacrifice.

Think of this while you are on the job. And if there be a slacker in your midst, a man who, by action or word, slows down the effort, shame him into being a good American instead of a slacker who is unwittingly working for the enemy.

the order permitting installation of such equipment on wells that are deepened, and allowing for interchanging of equipment between wells on the same lease.

Well Spacing Blamed For Illinois Decline

ILLINOIS could increase its oil production by as much as 75,000 or 100,000 barrels per day, in the opinion of Dr. M. M. Leighton, chief of the Illinois Geological Survey, if federal regulations on drilling were removed or liberalized to fit geological conditions in his state. By the same token he holds that the resulting increase in drilling would boost Illinois reserves greatly. He has characterized the wide spacing of wells, as required under M-68, as "ill-adapted to the narrow, elongated fields of Illinois, and to the rapid changes in reservoir conditions that have been noted in pay formations of the Illinois Basin."

Farm Equipment To Be Highly Mechanized

THE farm industry, a big market for petroleum products in recent years, will be an even larger consumer of oil goods after the war. Old Dobbin is to be pushed farther into the background by mechanical advances in farm equipment, as manufacturers of engines and other mobile units seek post-war outlets for the large plant capacities they have created under the impetus of war.

Already, for example, a new self-propelled gasoline-fueled combine capable of cutting and threshing 25 acres a day has made its appearance. Only a few of these machines were in existence during 1943, but they are being produced in volume for the 1944 harvest.

Mineral Rights Policy Is Explained by FSA

EXPLANATION of the policy being followed by the Farm Security Administration with reference to retention of minerals by the government on sales of land owned by the government, is contained in a letter received by THE OIL WEEKLY from W. J. Green, of Dallas, Texas, Assistant Regional Director in charge of farm ownership, in response to an inquiry on this subject. Says Mr. Green in his letter:

"Two types of land sales are being made by the Farm Security Administration. One type is made to families who will occupy and operate the land. In such cases the government retains three fourths of the mineral rights and transfers one fourth with the property.

"Land which is not suitable for dividing into family-size farms is declared surplus and sold to the highest bidder. The only land which has been offered for sale under these conditions in this region is a tract in Nacogdoches County. In giving us authority to declare this land surplus and offer it for sale our Washington office stipulated that all of the mineral rights would be retained by the government."

Mackenzie Area Now Called Limitless

REFERRING to the controversy about whether or not the Canol project is justified, Professor Lowell R. Laudon, head of the geology department of Kansas University, has broken into public print with statements terming the oil possibilities of Canada's Mackenzie River Basin as "apparently limitless." Citing his experience as a summer geologist with Imperial Oil Company, he said "We found oil reservoirs 100 times as big as we first thought existed in the northern area."

If this is so, we can stop worrying about shrinking oil reserves. All we have to do is to drill this "apparently limitless" province whenever we need oil. This would make the area the only one of its kind in the world. Only time will reveal the truth about Canol and other Mackenzie area structures.

Gasoline Really Getting Short

THE warning that there isn't any "extra" gasoline has been sounded many times recently. Now it comes again with a suffix. There is no "extra" gasoline for anybody.

Not only is the supply for civilians critically short — there is real anxiety about the supply for our military efforts. More than 3 out of every 10 gallons of all the gasoline produced east of the Rocky Mountains goes to our armed forces already, and this may be increased to 4 out of every 10 gallons as more men and more weapons are sent overseas.

And in the face of these facts, there is a serious black market dealing in gasoline: In Philadelphia, in October, enforcement officers uncovered counterfeit gasoline ration stamps worth more than one hundred million gallons.

More Active Part In State Matters

MORE active participation by men and organizations of science in the affairs of the nation, state, and community was urged by Gaston Dubois, senior vice president of Monsanto Chemical Company, last week, when he spoke before a meeting of chemists and other scientists, in New York.

He emphasized that it is useless and unbecoming to criticize activities of city, state or federal governments unless constructive ideas and a sound program can be suggested, and he maintained that in a democracy, groups of citizens should cooperate with government agencies in creating a sound national program which would better serve the needs of the nation.

The oil industry has accumulated vast scientific and technical data in attaining its present status, and the research personnel responsible for this progress ranks high in scientific standing. Also, the industry has done what Dubois suggests, perhaps as much, if not more, than any other group of industrialists. Much of the information that is by rights strictly private and confidential to the companies has been turned over to the government for the public good. Knowledge of synthetic rubber manufacture is the most recent instance of such an action.

Sometimes such information is not accepted with the same spirit in which it is given. For example, a great deal of scientific knowledge has been brought to bear in the crude-price situation, with no apparent success. However, the truth of Dubois' recommendation is in no wise changed by failure of the government to make use of facts. Such a case only serves to put new emphasis on the necessity for fighting to the finish for a principle.

After all, government is as good or as efficient as the people comprising it. The fight for a higher crude price has impressed many persons with this fact, who undoubtedly were not too conscious of it heretofore, and before the fight is finished, some representatives of government may be replaced with others more inclined to consider a fact.

A great Texan has said that "A cultivated mind is the guardian genius of democracy." It is the obligation of men of learning to impress on government, from the most rudimentary units to the most complicated, that real progress can only come through enlightenment. Scientists should always take the lead in this crusade.

Petroleum Reservoir Efficiency And Well Spacing

Importance of well pressure control and withdrawal rate shown in four-year study; operations and experiences in pools of both North and South America included in report

THE rate at which oil is withdrawn from its underground storehouse has an important bearing on the probable ultimate recovery from a particular field. Careful control of well pressure and other operating factors is another "must" if recoverable oil is not to be left behind in the ground. On the other hand, the number of wells or the distance between them has little practical effect in the long run on the total amount of oil that can be brought to the surface; provided the rate of withdrawal of oil from the reservoir as a whole and from the various portions thereof are properly controlled.

These are some of the most significant conclusions from a four-year study of the behavior of petroleum in its original reservoirs that has just been completed by engineers of Standard Oil Company (New Jersey) and those of its affiliate, Humble Oil & Refining Company, the results of which are made available to the industry in the form of a 100-page book. The survey, probably the most extensive of its kind ever made, correlates exhaustive laboratory research carried on by the companies with actual field experience on two continents. Pools with widely varying geologic characteristics and operating conditions were studied in Oklahoma, Louisiana, Arkansas, Texas, as well as Venezuela, Colombia, Peru and Argentina.

The salient features of the committee's findings are summarized in the following paragraphs:

Fundamentals of Reservoir Behavior

An oil reservoir of the sand type is made up of porous and permeable rock, the interstices of which contain oil and gas under pressure. The oil, under reservoir pressure, normally contains gas in solution, and any gas present in excess of that which can be held in solution in the oil under the prevailing pressure and temperature will be found occupying the higher portions of the sand body in the form of a gas cap. Salt water usually is present, underlying the oil and occupying the sand body extending away from the oil-bearing zone. The original static relationship thus is one of free gas, if present, occupying the crest of the structure, oil underlying the gas, and water below the oil. This zonal arrangement is due to the gravitational segregation of the fluids over geologic time.

Aside from the possible presence of underlying water, oil sand normally contains in its pores some initial interstitial or connate water (commonly ranging from 10 percent upward) held by capillary forces, thus reducing the possible oil content of the sand. The content of surface or stock-tank oil is further reduced by the fact that the reservoir oil shrinks in volume due to the release of the dissolved gas upon reduction of pressure.

The gas dissolved in reservoir oil has important beneficial effects on the physical properties of the oil, the most important being the reduction in viscosity. Gas in solution renders the oil much more mobile and easy flowing than it is after the release of gas from solution, which occurs with pressure decline.

The flow of reservoir fluids through sand is a mechanism in which pressure, relative permeability to oil, gas or water, and relative saturation of the three fluids are gradually changing. Permeability to each phase, after flow is established, is dependent upon the relative saturations of the pore space. However, at low relative saturations there may be practically no flow of a particular phase. This is illustrated in dissolved-gas-drive fields where produced gas-oil ratios are equivalent to solution gas until the saturation of free gas in the sand has reached 5 percent to 10 percent, when the produced gas-oil ratio begins to increase. Increase in the water saturation of a sand as water advances has a somewhat similar effect, eventually resulting in high water-oil ratios, but the trend is less rapid than with gas, with the result that a much larger portion of the oil in place will be displaced by water advance before oil flow becomes negligible.

It is impossible to recover, by normal means, all of the oil originally present in a sand, the actual limit being dependent on sand and fluid characteristics. As a broad rule of thumb, maximum yield may be regarded as around 80 percent of the original oil in place, that remaining unrecovered usually being termed the minimum residual saturation.

Oil Recovery Mechanisms

Three basic mechanisms by which oil can be recovered from the sand may be set up. These are (1) simple expansion of the gas released from solution in the oil, no free gas cap or water source being present; (2) displacement of the oil from the sand by downward expansion of a free gas cap, and (3) upward displacement of the oil by influx of water from below the oil sand. These processes have been labeled, respectively, *Dissolved Gas Drive, Gas Cap Drive* and *Water Drive.* In practice, it is seldom that any one mechanism is the sole agent in oil recovery, but the degree to which one or another is utilized will have direct bearing on field behavior and ultimate oil yield. The degree to which gravitational segregation of the various fluids is retained or favored will also bear on the practical effectiveness of these mechanisms.

Dissolved Gas Drive—This mechanism has inherently the lowest efficiency of oil recovery since it depends solely on the relatively limited quantity of the dissolved gas for expulsion of oil from the sand. Both rate of oil flow and ultimate oil yield are dependent primarily on degree of exhaustion of the gas. Possible ultimate yield will usually amount to

from 20 percent to 40 percent of the original oil in place.

Proper control of the dissolved gas drive type of field may result, to some extent, in the utilization of the other more efficient recovery mechanisms. This drive may be approached, however, under wide open flow conditions, wastage of gas from a free gas cap, and similar practices with probable damaging effects on the oil recovery prospects of a field, even though more efficient practices may later be introduced.

Gas Cap Drive—The gas displacement mechanism, called gas cap drive, is capable of yielding substantially higher recovery than dissolved gas drive. In this mechanism, the displacement action of a downwardly expanding gas cap maintains pressure on the oil sand and averts or retards evolution of gas from solution.

The degree to which the maximum recovery will be attained in this mechanism is in large part dependent on the degree to which gravitational segregation of oil and free gas, to maintain a separate and distinct expanding gas cap, is effected during the productive life of a field. The recovery expectancy thus covers a rather wide range, but yields of from 50 percent to 100 percent greater than under dissolved-gas drive may be realized, with a potential yield, under very favorable conditions, approaching the limit of minimum residual oil saturation. Practical requirements for effective gravitational segregation of oil and free gas include highly permeable sands, gas conservation, and usually, pronounced structural relief.

Where a free gas cap does not originally exist, it is often feasible to create one by the injection of gas at the crest of the structure, or gas injection may be used to maintain and enlarge an original gas cap. Such an operation is commonly known as "pressure maintenance" and probably represents the most efficient form of gas-cap drive.

Withdrawal of free gas from the cap must be avoided for realization of full benefits in gas cap drive, and similarly, careful control of well rates must be employed to avoid channeling or by-passing of free gas and to favor its accumulation or retention in a gas cap by gravitational segregation.

Water Drive—In this mechanism, water advances upward into the oil sand as oil and gas are withdrawn. The displacing effect of the advancing water tends to maintain pressure in the reservoir by offsetting the fluid withdrawals and to cleanse the sand of oil up to the limit of the minimum residual oil saturation. Water drive is believed to be inherently the most efficient natural oil recovery mechanism in the majority of sand reservoirs, since the sands are usually water-wet under original conditions (initial interstitial water) and the flushing action of the water can be very thorough.

Editorial Index to 1943 Issues Available Upon Request

Due to the paper shortage, THE OIL WEEKLY again is deviating from its long-standing previous custom of incorporating its Annual Editorial Index in one of its regular issues mailed to all subscribers. The complete editorial index covering all issues of THE OIL WEEKLY published during 1943, bound separately in convenient pamphlet form, will be sent without charge to each subscriber requesting a copy.

Address requests to Circulation Department, Box 2608, Houston 1, Texas.

The rate at which water advance will occur in any reservoir depends upon a number of factors, but it is usually found that a rather severe measure of restriction in oil withdrawal rates is required if the water influx is to maintain reservoir pressure at a high level and the desired segregation of oil and water in the sand is to be achieved. In the Gulf Coast of the United States many fields are currently utilizing water drive to a high degree, and in such fields it has been found that initial oil withdrawal rates of about 3 percent to 5 percent of ultimate yield per year permit very efficient high pressure water displacement.

Because of the inherently effective flushing action of water in most reservoirs, even inefficient or delayed (i.e., following wide open flow) utilization of water drive may result in fairly high oil yield, although not the maximum. However, realization of high yields in such an operation requires very favorable sand conditions or extended operation under stripper conditions producing large volumes of water.

The physical requirements for effective water drive include a large, continuous and permeable water leg, either extending regionally as a sheet sand over a large area or outcropping at not too great distance. The presence of major sedimentary changes or major regional faulting, if they destroy the effective continuity of the water leg of a reservoir near the oil accumulation, will generally preclude the possibility of active water drive as a major oil recovery mechanism.

Well Spacing

The fundamental nature of well drainage may be visualized by considering that when a well penetrates an oil sand, the withdrawal of oil and gas permits the expansion of the compressed reservoir fluids and their flow to the well from gradually increasing distances as pressure declines and the expansion process continues. In principle, there is no limit to the distance to which this pressure or drainage radius may extend in continuous sand, time alone determining the distance reached at any instant in the depletion period. Thus, there is no fixed or limited drainage radius and the effect of many wells, rather than few, is essentially one of acceleration of depletion due to early intersection of the expanding zones of influence of the wells.

In *Dissolved-Gas Drive,* this pressure-time relationship governs the entire oil recovery cycle and, through the influence of spacing on time of depletion, it may be seen that for any chosen time limit, short of full depletion, the cumulative recovery may be higher for close than for wide spacing. Similarly, current total rate of production may be higher due to the greater number of wells, and this may, of course, have some bearing on cumulative recovery at any given economic limit on rate of production. These differences will be of little importance, however, within the range of spacings and depletion times usually considered in practice.

In *Gas-Cap Drive* and in *Water Drive,* the pressure-time relationship is greatly modified since the influx of the displacing media serves both to sustain pressure and drive oil to the producing wells. Thus, in these mechanisms, well spacing or distance between wells has, in itself, little influence on oil recovery, and well spacing becomes largely a matter of efficient control of the displacement action.

The Committees' general conclusion on well spacing is that, within the range of spacing likely to be encountered in practice, distance between wells has, in itself, negligible effect on ultimate oil recovery but, instead, affects mainly the factors of over-all depletion time and proper control of reservoir fluid movement. The optimum spacing for a field thus becomes essentially an economic problem. Of considerable importance, however, is proper well location to insure drainage of lenses and fault blocks, and to provide control of movement of gas and water in the sand. Control of per well rate of production, which is a major factor in individual well efficiency, is also of importance. It may also be expected that an excessive number of wells

■ CONTINUED ON PAGE 14

Farmer Cooperation Relieves Oil Field Labor Shortage

Production workers lend a hand with summer crops and now with growing manpower shortage oil operators must look to local interests for help; some draft boards indorse idea

By F. R. COZZENS

DESPITE the official ruling that certain classes of oil-field workers are essential to war production, there exists in many producing districts a critical manpower shortage which will invariably grow worse as deferment requirements become more strict and military inductions continue. The War Manpower Commission has already tackled this problem and its consequences in a general way, but oil operators are being made to realize that any benefits thus derived must, of necessity, be created with local materials and centralized within the industry itself. In many districts of the Eastern stripper fields where the labor and equipment situation was serious even in the early stages of the war, some very effective relief is being obtained by closer cooperation between oil operators and farmers.

There seems a wide contrast between the growing of crops and the production of oil, but since practically all oil properties are situated in rural areas, it invariably occurs that the farmers of that locality have a fair working knowledge of production technique, and the majority of oil-field workers themselves, have been reared in, or brought into close personal contact with a farming environment. These facts became very much in evidence last summer when scores of oil-field laborers took time out to help farmers save their crops. This farm work was done mainly by pumpers, casing-crews, and roustabouts, at various odd times when lease duties were not urgent, and since the farm wage scale is considerably lower than that in the oil fields many farmers offered to balance the difference through an exchange of their own labor and equipment. Oil operators who had encouraged the odd-time work soon discovered that the farmers' horses, trucks, and tractors were quite capable of moving drilling machinery and lease equipment, and they discovered also that this force could often be utilized when commercial hauling facilities were tied up on other jobs. Experiments in labor staggering, lease work, property rights, etc., eventually led to the forming of a labor exchange plan which with but slight variations, is now being operated successfully in more than 30 oil-producing districts.

It was learned at a very early stage that an oil-field worker can best aid the farmer with the least possible time taken from his regular duties, during the seasons of planting and harvesting. Let it be remembered that farmers too, are severely handicapped in regard to manpower, and an extra hour or two per day or even a few hours per week from an outside worker at the right season will do wonders in making or saving a crop. Understanding this point, the oil operator who desires to share in a labor exchange, rearranges his pumping schedules and lease work so that certain odd hours can be spared. The worker or workers who can be released from duty at those hours are encouraged to spend them at labor on nearby farms. Only a very small percentage of workers have objected to this, and since agriculture is also a deferrable occupation there is very little risk of interfering with a military classification by "pinch-hitting" for a farmer. Many Selective Service Boards, in fact, endorse the idea. The worker who goes out to a farm is paid for straight time at regular wages by his oil-field employer, and the farmer is billed later for the number of hours expended. The farmer in turn agrees to compensate the oil operator for the service at the prevailing rural wage scale, either with his own labor or with the use of some of his equipment according to previous arrangements. The operator and farmer generally discuss and agree upon the manner of exchange before the work is done. As a common working basis for computing wages, which vary somewhat according to locality, two hours of man-labor are generally allowed for each hour's service with a team of horses, four hours of man-labor being equal to one hour's use of tractor or truck. The farmer or his hired man usually operate the equipment and this service is included in the estimation. Recognizing the farmer's busy seasons, the oil operator asks return service, whenever possible, when crop tending is not of vital importance. Favorable times are, after summer storms, during late autumn, winter, and early spring. By a little advance planning, a considerable amount of lease work, such as, fitting up wells, laying lines, transporting equipment, etc., can be accomplished at such times so that operations requiring more skill and better weather conditions can be carried out later without interruptions. Farmers, as a rule, do not adhere strictly to an eight-hour day, and various mechanical jobs, hauling with horses or truck, etc., are willingly carried out during evenings or at night. Under present conditions, this over-time service is proving valuable in the oil fields.

Farm labor was initially intended to relieve the strain upon, but not to replace, skilled oil-field workmen, but in certain localities where the drain on skilled men has been heavy, the rural labor is taking over many semi-skilled jobs under local coaching. One oil producer in a Southern Ohio county recently conditioned a number of wells

for secondary recovery with clean-out crews made up entirely of farmers. These men served not for cash, but for an exchange of help from lease men at harvest time, and were coached by an aged driller who knew the business but was unable physically to do hard work. On scores of other leases, farmers and their tenants are pinch hitting as roustabouts, temporary pumpers, casing and pipe crews, as well as miscellaneous field work. The men reside in the immediate locality of their jobs, and often own the land upon which the wells are situated. In most cases they are supervised by men who will return the favor with their own help in saving crops.

Aside from divers labor and mechanical aids, the farmer possesses other opportunities which no oil producer can afford to overlook. His pastures generally contain undergrowth, easily converted into cordwood which is a wartime substitute for coal. Often there are trees of sufficient size for masts, derrick timbers, traveling beams, and sills. Portable sawmills, common to most localities, are capable of cutting such stuff to the right dimensions, and as a side issue these mills also turn out boards, at a substantial saving in time and transportation. There is smaller timber for such needs as braces, line poles, and shackle work. From farmer-owned streams come sand, gravel, and ruble rock for wartime foundations, and from the farmer's grain bins, refuse wheat and rye are now going into many wells, between strings of casing, to ease the strain on weak pipe. A very prominent wartime packer is being made of burlap, soaked in warm tar, and backed up with a stemming of wheat.

Farmers who share these local benefits with oil operators, and thus become better acquainted with the production end of the industry, are much more lenient in the matter of contract and lease terms, which, under present conditions can not always be carried out to the letter. There is also less suspicion and distrust over operating methods. Since exploratory drilling is becoming necessary in many districts, farmers who know the facts are less inclined to insist on close offsets. In some districts they have contributed fuel, labor, and equipment towards the drilling of test wells. These mutual services may be shared individually or through group action, taking in farming areas of three to five miles. In fully 90 percent of the cases the effort proves successful, and the oil producer who takes time out for rural cooperation establishes a sound business footing, not only for the present emergency, but for the years of reconstruction which will follow the peace.

Petroleum Reservoir Efficiency and Well Spacing

• CONTINUED FROM PAGE 12

may force total field production up to a rate beyond the range of efficient recovery and cause waste of oil.

Bearing of Field and Economic Conditions on Oil Recovery and Well Spacing

The degree to which the basic oil-recovery mechanisms will operate in practice and in possible oil yields obtainable, together with the optimum economic well spacing for a particular field, will depend on the physical conditions in the reservoir and the limiting effect of economics or other imposed restrictions on such factors as depletion time and abandonment point.

Other things being equal, perhaps the most important physical factors governing oil recovery expectancy in practice are the permeability of the sand and the viscosity of the reservoir oil. High permeability and low viscosity are nearly always conducive to high yield within the limits of whatever recovery mechanism is operative and, furthermore, often have an important bearing on the recovery mechanisms available as a practical matter. With highly permeable sands and low oil viscosity, the entire recovery process is accelerated, gravitational segregation of fluids is more prevalent, and effective utilization of water drive is economically more feasible.

It can be appreciated that economic considerations will govern the point at which operations must be abandoned for reasons of cost. This point of cut-off of the depletion cycle will vary widely, but its broad place may be appreciated by considering the influence of such factors as excessive water production, excessive gas recycling in gas return operations, and the limit to which stripper production, as might follow wide-open flow, may be carried to secure increased ultimate yield.

Similarly, economics may largely decide the optimum well spacing. For example, it may be found from study of a reservoir that a certain wide spacing would, under existing reservoir and well operating conditions, require perhaps 50 years or more for depletion. If this were too long, the operator would have to weigh the cost of a closer spacing, hence higher investment, against whatever advantage would accrue from the lesser depletion time which might be obtainable by such closer spacing.

Information for Reservoir Studies

The committees agreed that the securing of requisite data should be a major objective in field development and operation, the relatively low cost of such a precaution being insignificant in comparison with the benefits stemming therefrom in the way of dependable analyses of field behavior. The information generally required in making reservoir studies is outlined here. Such information should be obtained for each individual reservoir.

1. Complete structural and sand-thickness data and a description of the geological aspects of the reservoir. The entire section should be cored in key wells and the cores subjected to complete analysis, including determination of physical properties and fluid saturation.
2. Complete analyses of sub-surface samples of the reservoir fluids, including viscosity, flash and differential liberation, pressure-volume relations, saturation pressure, and a complete hydrocarbon analysis. The samples should be obtained as early in the life of the field as is convenient and in an area having as nearly as possible the original reservoir pressure.
3. Sub-surface pressure surveys should be made by taking pressure readings in a sufficient number of wells to give an acurate trend of the average reservoir pressure at a given datum. Surveys should be run at least on an average of one per year and more frequently for new fields or following radical changes in conditions.
4. Productivity factors should be run for at least 10 percent to 15 percent of the wells, and, if practicable, for all wells.
5. Accurate data on gas, oil, and water production for the entire reservoir should be compiled for correlation with sub-surface pressure surveys.

Relationships Between Price, Exploration Activity and Petroleum Discovery Volume

PART 2

By E. E. ROSAIRE, Subterrex, Houston, Texas

PERHAPS the most cogent reason advanced for an increase in the price of crude oil is that thereby more wildcat wells will be drilled with, supposedly, a consequent increase in the amount of oil discovered. In view of this argument, the next step*, obviously, was to investigate the possibility of a relationship between price and exploratory activity as measured by the number of dry holes (W).

Price Versus Wells (Exploration Activity)

The data on purely exploratory tests are not available for the whole period 1901-1941, and in studies of this sort, practice has been to use, instead, the number of dry holes drilled. Thus in the articles referred to earlier, the following statements were made.

Pratt says: "A dependable measure of the effort devoted to exploration is the number of dry holes drilled. This statement is true despite the fact that a few exploratory tests are completed as oil wells, and that a small number of dry holes result from the exploitation of already known fields rather than from exploration for new fields. In other words, if the record of exploration were corrected to include successful exploratory tests, and to exclude dry holes drilled in exploitation, it would not be significantly changed."

Pogue says: "Table 2 shows, for periods from the inception of the industry to the present, the rate of oil discovery in comparison with the price of crude oil and the rate of search (as indicated by the number of dry holes)."

McCollum says: "Chart II shows—a generally direct relationship between the average crude oil price, dry holes drilled (a measure of finding effort)—"

On that assumption, the data on dry holes (rW) and price (rP) from Table 1 were investigated in the same manner and for the same spreads of years as used earlier in establishing the relationships between discovery and price.

Figure 7 shows the values of the ratio (r/E_r) over the indicated periods of lag and lead (W, the number of wells, to P, the price). The outstanding correlation is at 0 years on the 1901-1921 spread, where the ratio (r/E_r) reached a peak value of 64.5. This 0 year relationship is first evident in the 1901-1915 year spread, rises to a maximum in the 1901-1921 spread and then drops off in magnitude, although a suggestion of its presence persists even into the 1901-1941 spread. Other relationships are suggested, but none of them compare in magnitude or persistence with that at 0 years. Figure 7 shows also the values for the lines of regression, the correlation coefficient, the ratio (r/E_r) and the standard error of estimate for the indicated peaks at 0 years.

Whereas the lead-lag study for price versus discovery volume indicated three possible relationships (at 1.5, 8 and 10 years lag), Figure 7 shows only one outstanding relationship, that at 0 years between price and exploration activity as measured by the number of dry holes.

This 0-year relationship between P and W has some characteristics in common with the 1.5-year lag relationship between P and D. Both are of the same order of magnitude in time, both are prominent over the middle third of the 41-year spread, and both disappear, for all practical purposes, in the last third of the full period.

Figure 8a shows a graphical comparison between the reported number of wells (rW) and those calculated (cW) from the line of regression for the maximum observed value of the ratio (r/E_r), i.e., the peak in the 1901-1921 spread. Figure 8b shows a plot of this line of regression and the associated standard error of estimate, the indicated linear relationship between price and wells drilled the same year for the period 1901-1921.

The success factor in prospecting can be expressed in several different ways, each applicable to a particular kind of investigation. Thus, use can be made of the confirmations credited or the number of million barrels discovered per exploration crew year. In this study, however, the well success factor (WSF) is the appropriate form, and is obtained by dividing the discovery volume for a given year by the number of wells drilled that same year. WSF, then, is expressed in millions of barrels per well, and is a measure of the average discovery success per individual effort achieved by the industry in a given year of wildcatting.

Since, by definition, WSF is the ratio of D to W, the relationship between rP and cWSF was determined by making use of the relationships already established between rP and cD for 1901-1924 and between rP and cW for 1901-1921.

Thus,

$$cD = .420\ (P_{1.5} + .186)$$
$$cW = 1.83\ (P_0 + 1.10)$$

from which

$$cWSF = \frac{cD}{cW} = \frac{.229\ (P_{1.5} + .186)}{(P_0 + 1.10)}$$

Figure 9a shows a comparison of rWSF (from Table 1) with cWSF as calculated from this equation. As would be expected from the origin of cWSF, better agreement occurred in the first half of the 41-year spread.

Discovery Volume Versus Activity

For about the first half of this 41-year period, the observed relationships for P versus D and P versus W were found to be such that activity led discovery volume, for, while a linear relationship was found between price and activity of the same year, the linear relationship found for price and discovery volume was such that price led discovery volume by 1.5 years.

This conclusion was confirmed by a direct comparison of activity and dis-

* Part 1, published in the preceding issue, discussed the need for the United States to maintain an annual discovery rate equal to its annual production, and presented views on the most frequently mentioned stimulant—higher crude oil prices. The relationship of price with discovery volumes and other factors, based upon studies of experience during the past 41 years, also were discussed.

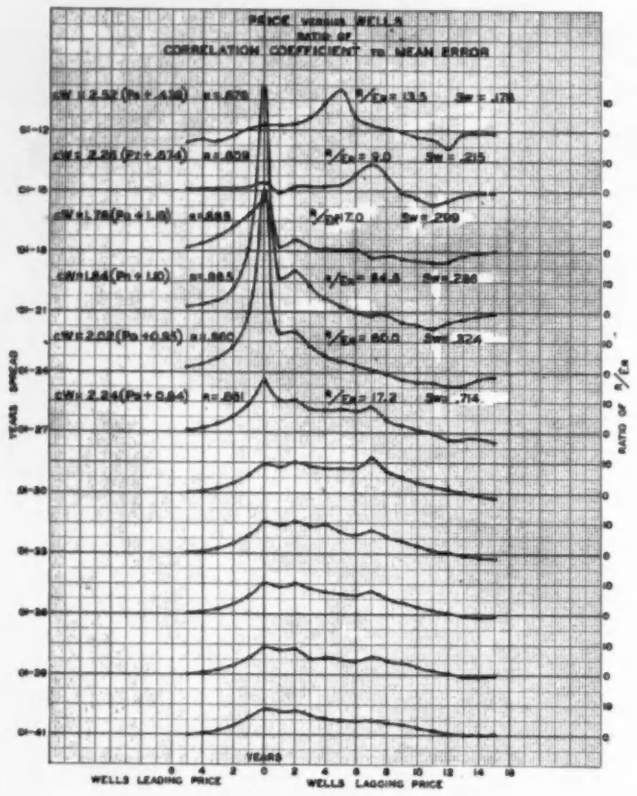


FIGURE 7

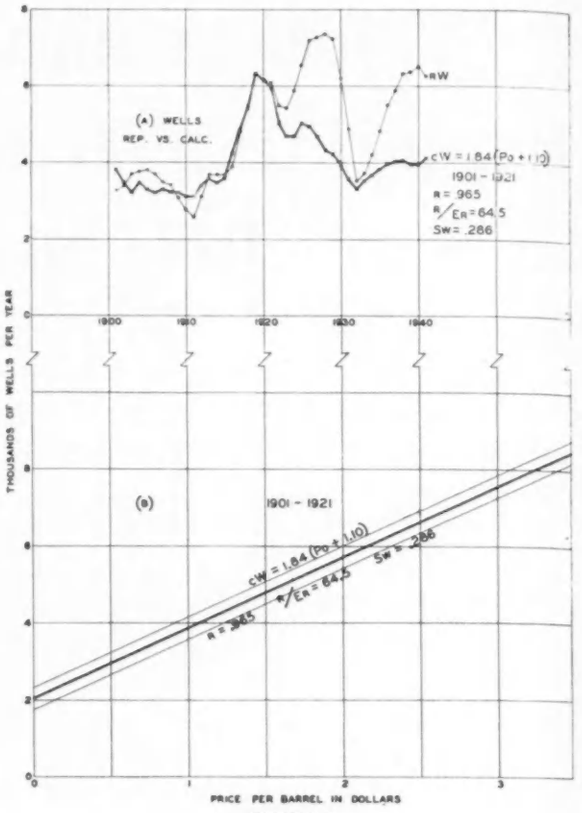


FIGURE 8

covery volume through the use of a lead-lag study of D and W, the results of which are shown in Figure 10.

The outstanding relationship shown is such that discovery volume lags activity by 1.0-1.5 years, first evidenced in the 1901-1921-spread, and continuing into the 1901-1941-spread.

Figure 11a shows a comparison between the reported discovery volume (rD) and that calculated from the relationship indicated by the peak in the plot of the ratio (r/E_r) for the 1901-1924 spread, and called (wD) for the purpose of identification.

The difference between rD and wD (shown year by year in Figure 11b) totals 13.2 billion barrels for the full 41-year spread, whereas the difference between rD and cD (shown year by year in Figure 4a) totals 20.1 billion barrels over the 41 years. Thus, the relationship between W and D has stood up somewhat better than the relationship established between P and D.

If the volume of the East Texas field is taken out of rD (as shown by the crosses and doted lines in Figure 10), the peak relationship between activity and discovery volume reverses, so that after 1939 the corrected discovery volume leads activity by about 0.5 years.

Inspection of Figure 11a shows how this comes about.

For the rD peak in 1921-1922, the wD peak is approximately in phase, so that, up to that point, activity led discovery volume by about 1.0 years (the relationship used in calculating wD).

The next peak in rD is at 1927, succeeded immediately by the 1929-1930 peak due to the East Texas field. The wD peak, however, is broad and flat, extending from 1927-1930. Obviously, if rD is corrected for East Texas (rD'), then the wD peak at 1927-1930 lags the 1927 peak in rD', i.e., activity lags discovery volume.

This interesting point is shown to even better advantage in the 1930-1940 decade, for rD starts up in 1932 and peaks in 1937, whereas wD starts up in 1934 and peaks about 1941. The significance of this reversal (from activity leading discovery volume to activity lagging discovery volume) is discussed later.

Discussion

To facilitate study, Figure 9b is a reproduction of Figure 4a (the comparison of rD and cD for the 1.5-year lag relationship), and Figure 9c is a reproduction of Figure 8a (the comparison of rW and cW for the 0 year relationship). Together with Figure 9a, a direct comparison can be made of the agreement between the reported values for well success factor, discovery volume and activity and those values calculated from the determined price relationships.

As was pointed out earlier, and as is shown in Figure 9b, although the effect of price upon discovery volume apparently disappeared after 1924, there is an indication that it may have reappeared in 1932 (when rD decreased to 825 million barrels, only 300 million barrels greater than cD), and again in 1941 (when rD decreased to 750 million barrels, only 230 million barrels greater than cD). Further, although the effect of price upon activity apparently disappeared in 1921, it may have reappeared in 1932, when rW decreased to 3525 wells, only 200 wells greated than cW. (Figure 9c.)

From the standpoint of the current question (i.e., will a price increase stimulate discovery rates?), it is primarily important that these data be studied with a view to determining whether (1), the effect of price persisted and was only submerged, or (2), in view of the material changes in prospecting which have taken place since 1924, was the previously dominant price effect replaced entirely, not to return?

At first hand, it appears more reasonable to conclude that the effect of price persisted and was only submerged by the later introduced factors. The main support for this argument lies in the return of the reported discovery volume almost to the level of that predicted (from the earlier price relationship), first in 1932 and again in 1941. However, on this basis of persisting price control, we are forced to a con-

ception involving the simultaneous operation of two groups of prospectors working independently, one of the old school doggedly operating on the basis of price alone and achieving predictable if unspectacular success, while the other, using post-1925 tactics, achieved spectacular but inconsistent success.

A more rational approach is that of attacking the problem on the basis that the pre-1925 price control, as it existed then, was replaced entirely by the operation of post-1924 factors, in accordance with the following analysis.

Consider the normal functioning of industry-wide prospecting. When an important technological advance takes place (such as when production is established for the first time in a given horizon of regional extent, when discovery occurs in a province hitherto without established production, or when a new technique is proved to have merit beyond that displayed by current methods), activity develops with the consequent recognition and testing of prospects in accordance with estimated degrees of promise. The numerical relationships are such that relatively few of the total number of prospects are in the uppermost level of promise, and that, in general, the lower the level of promise, the greater the number of prospects.

Quite naturally, the industry first tests the relatively few prospects in the uppermost level of promise. If that original estimate of promise was sound, the result is discovery attended by a high success factor. Continued exploration and testing takes place, working primarily on those prospects in the extant uppermost level of promise, with a consequent steady decrease in the observed success factor as level after level of the more promising prospects are tested.

The industry, of course, does not first find all the prospects, estimate their individual degrees of promise, sort them out in layers and test them in order from the top layer down. From a practical standpoint, however, about the same result follows from a less orderly field procedure.

As an illustration, consider the current Gulf Coast campaign, in which the estimated degree of promise has been primarily the number of feet of closure (as indicated by the reflection seismograph) within reach of the drill.

When that campaign opened, our apparatus was crude when compared with that in use today, and, naturally, our early exploration was attended by large observational errors. However, we then paid little or no attention to minor features (wherein the currently large observational errors would have been important) because we were searching for (and we found) prospects at relatively shallow depths (5000 feet) with several hundred feet of reflection dip closure. These were structural features such as Iowa, Manvel, Hastings, etc., which without question were in the uppermost level of promise as recognized today.

As these earlier prospects were found, tested and proved to be of great merit, reflection activity increased, the technique improved, and we extended our search to greater depths for structures of lower relief. In these lower levels of promise, even more prospects were found, and so the Gulf Coast reflection campaign continues unabated to the present time.

Thus the net effect has been about the same as if the industry had made a complete inventory of all Gulf Coast prospects, arrtanged them in successive levels of relative promise, and tested them in order, level by level from the uppermost down.

If the estimate of promise remains sound (based on the extrapolation of the past factors of success), this process continues as long as the anticipated return (based on the estimate of promise for the extant uppermost level of promise) is appreciably greater than that minimum return which would justify the investment required for exploration and testing. Up to this time, the current exploration can be considered as in the "decisive" or "non-marginal" stage.

However, when the anticipated return (based on the estimate of promise for the extant uppermost level of promise) is comparable with the minimum

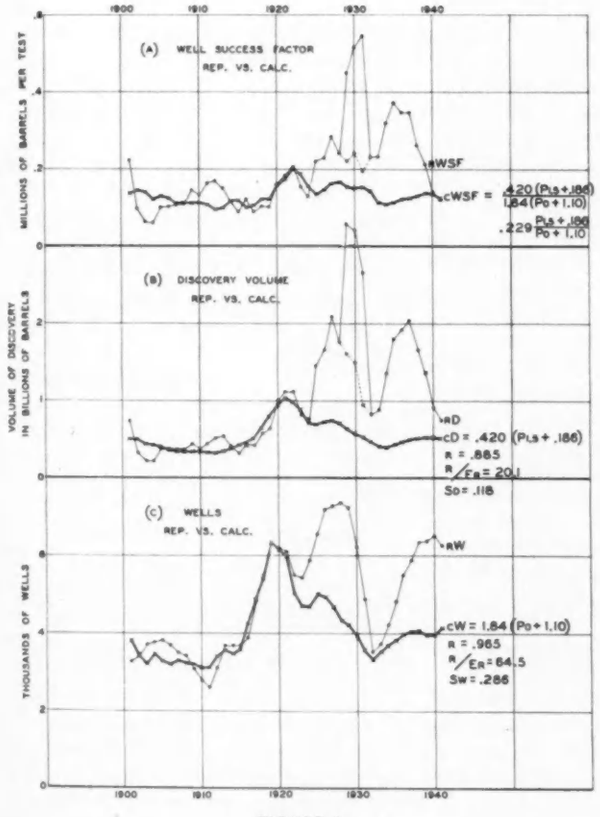


FIGURE 9

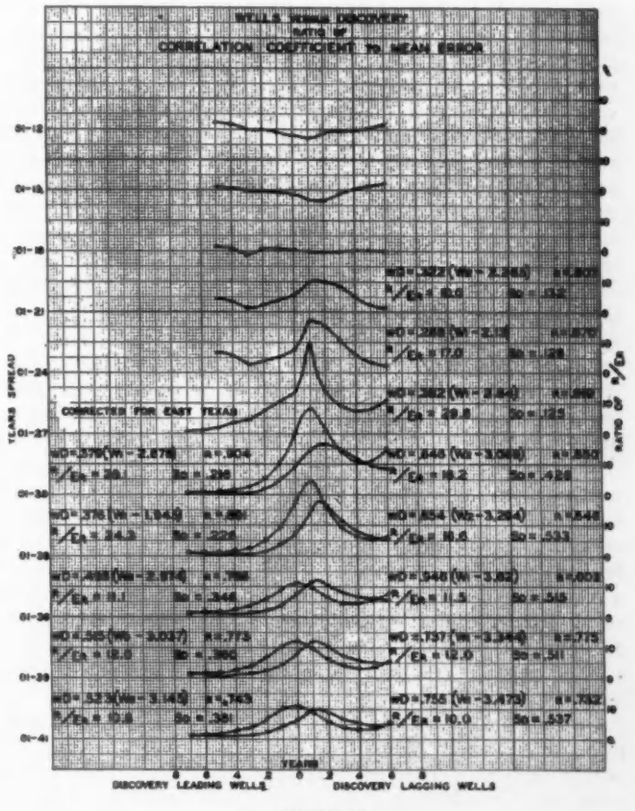


FIGURE 10

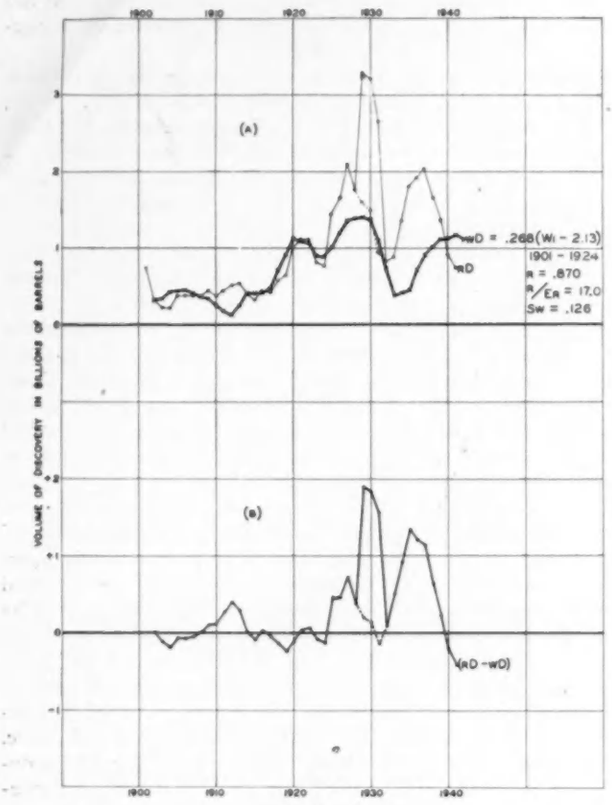


FIGURE 11

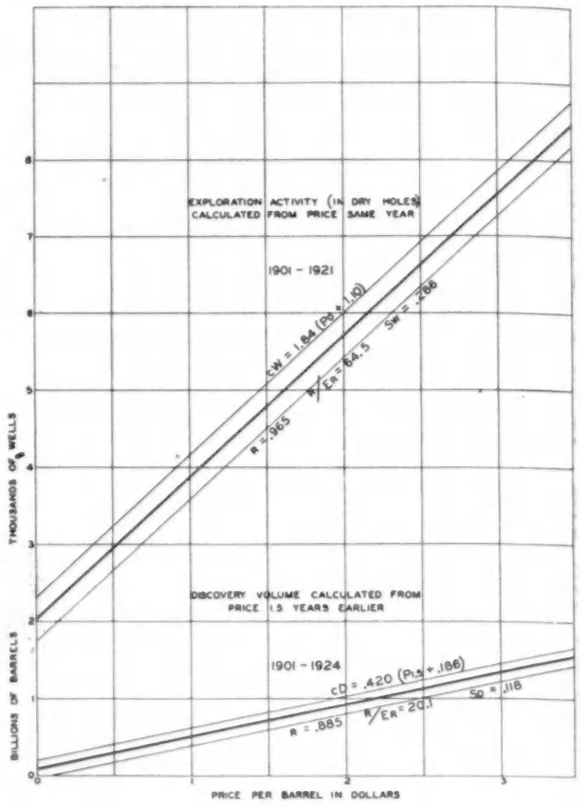

EXPLORATION ACTIVITY (IN DRY HOLES) CALCULATED FROM PRICE SAME YEAR
1901 - 1921
cW = 1.84 (Pi - .10)
R = .963
R/ER = 64.5
Sw = .266
DISCOVERY VOLUME CALCULATED FROM PRICE 1.5 YEARS EARLIER
1901 - 1924
cD = .420 (Pi-1.5 - .186)
R = .885
R/ER = 20.1
SD = .118
THOUSANDS OF WELLS
BILLIONS OF BARRELS
PRICE PER BARREL IN DOLLARS

FIGURE 12

required to justify the investment required for exploration and testing, current prospecting is characterized by only a "marginal" success factor. At this point, the effect of price enters the picture and becomes dominant, for the price of crude oil then determines the return on the industry-wide average investment. A decrease in price would leave the industry testing and contemplating testing prospects in a level of promise too low to justify consideration at the lowered price, while an increase in price, with the consequent greater return on the required investment, would leave the industry in position to give favorable consideration to those prospects on the next lower level of promise. Thus, a period in which price is the dominant factor must be regarded as one of "marginal" success in prospecting.

The third and lowest stage of prospecting success is that of "random drilling," and is reached when the estimate of promise for the extant uppermost level of prospect promise is so low that a comparable estimate of promise would result from the location of test wells at random, i.e., in the same fashion that a blindfolded participant "pins the tail on the donkey."

On this basis, the dominant effect of price in the first half of the 41-year period indicates that it was one of marginal prospecting, a conception which, if at first surprising, is not unreasonable in view of the following considerations.

Over the whole 41-year period, the reported discovery volume is 42.7 billion barrels, while that calculated on the basis of the 1.5-year-lag price relationship totals 22.6 billion barrels. The difference, which has accumulated almost entirely since 1924, is 20.1 billion barrels, surprisingly and probably significantly close to the present estimate of the known reserve for the continental United States.

By contrast, the period from 1901-1924, that of price control, and which includes the maximum variation in the running three-year price averages, was one of successive feasts and famines, one for which Brooks and Snider (quoted earlier) used "production" as the equivalent of "discovery." During this price-dominated period, the current discovery volume was never sufficiently greater than the current demand to permit the industry to set aside appreciable amounts of low-cost reserves (i.e., fields producing at optimum depletion rates instead of by the pump from reservoirs in which the original pressures had been dissipated by flush production practice). From the standpoint of an industry which finally has warehoused an adequate working inventory, it can be said that the period 1901-1924 was one of hand-to-mouth existence, and so of only marginal success in prospecting.

If the period of price domination is considered as one of "marginal (success in) prospecting," then the later period when price was not dominant can be considered as one of "non-marginal (success in) prospecting," when technology (and chance) replaced price as the dominant factor in prospecting.

Thus, price control did not persist after the early 20's. Its apparent reappearance for D and W in 1932 (and for D, again, in 1941) indicates the impending onset of marginal success in prospecting, the inevitable sequel to a period of prospecting characterized by a success factor well above marginal.

The question may be asked as to why, with the impending onset of marginal prospecting in 1932, did not price control return? There can be little question but what the situation was saved by the high success factor introduced by the use of the reflection seismograph, made available in 1930 and with success of record even earlier.

Data thus are at hand which permit some study of the conditions which have held in periods of "marginal" and "non-marginal" prospecting.

Marginal Prospecting Period

On the basis of past performance, these relationships (between price and discovery volume, price and wells, and price and well-success factor) for a period of marginal success in prospecting are those previously determined for

TABLE 2*

Overall Performance, 1901-1941

Discovery Volume (Billion Barrels)			Activity (Wells) (Thousands of Wells)			Well Success Factor (Million Barrels per Well)	
rD	42.7	100.0%	rW	200.9	100.0%	rWSF	.21
cD	22.6	53.6%	cW	166.2	82.7%	cWSF	.14
pD	20.1	46.7%	pW	34.7	17.3%	pWSF	.58
						pWSF/cWSF= .58/.14=4.3	

TABLE 2a*

Discovery Volume (Billion Barrels)			Activity (Wells) (Thousands of Wells)			Well Success Factor (Million Barrels per Well)	
pD′	15.0	35.0%	pW	34.7	17.3%	pWSF′	.43
						pWSF′/cWSF= .43/.14=3.1	

* These tables appear also on page 32, The Oil Weekly, January 3, 1944.

the first half of the 41-year period when price control was evident.

These are:

$$cD = .420\,(P_{1.5} + .186)$$
$$cW = 1.83\,(P_0 + 1.11)$$
$$cWSF = \frac{.229\,(P_{1.5} + .186)}{(P_0 + 1.11)}$$

Until additional experience is available over another and comparable period of marginal success in prospecting, these relationships furnish the only clues as to the results to be expected from this effect of price alone.

Figure 12 shows the lines of regression for cD in terms of the price 1.5 years earlier, and for cW in terms of the price the same year.

Figure 13 shows the double relationship between cWSF and the prices for the same year and for 1.5 years earlier. This chart shows that cWSF is higher for higher past prices, but decreases as the current price is raised. That was to have been expected in view of its origin, for the numerator, cD, is a function of the price 1.5 years earlier, and the denominator, cW, is a function of the current price.

In the foregoing discussion which showed that price controlled is marginal prospecting, the point also was made that, if the current price were raised, the industry would be justified in giving consideration to the next lower level of prospect promise, a conclusion which is confirmed by the relationship shown in Figure 13 between P_0 and cWSF.

Considering, then, that the values cD, cW and cWSF, calculated on the basis of previously determined price relationships, indicate the results to be expected at any time for marginal success in prospecting, then the differences rD-cD, rW-cW, and rWSF-cWSF represent (from the standpoint of success) the current premium which the industry enjoys, or (from the standpoint of hazard) the current factor of safety in the industry's favor. Using the prefix "p" to indicate "premium," then

$$pWSF = rWSF\text{-}cWSF$$
$$pD = rD\text{-}cD$$
$$pW = rW\text{-}cW$$

These "premiums" or "factors of safety" are plotted in Figures 14a, b and c. Their over-all importance to the industry is shown in Table 2.

Technology and chance were the two factors which replaced price as the dominant factor to bring about the period of non-marginal prospecting. A first-order correction can be made for the effect of chance by subtracting the 5.1 billion barrel discovery volume of the East Texas oil field from the 20.1 billion barrels credited to pD. Thus,

$$pD' = pD\text{-}5.1$$

where pD′ is the effect primarily of technology alone. (See Table 2a.)

Thus the "premium above marginal" credited primarily to technology alone represents a performance such that, in about half the time, about one third of the discovery volume required only about one sixth of the wells.

Earlier, in discussing the relationship

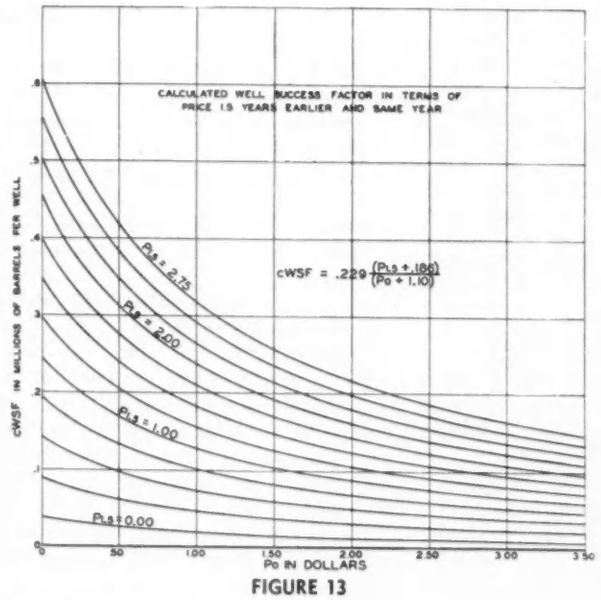

CALCULATED WELL SUCCESS FACTOR IN TERMS OF PRICE 1.5 YEARS EARLIER AND SAME YEAR
cWSF = .229 (P1.5 + .186) / (Po + 1.10)
P1.5 = 2.75
P1.5 = 2.00
P1.5 = 1.00
P1.5 = 0.00
CWSF IN MILLIONS OF BARRELS PER WELL
Po IN DOLLARS

FIGURE 13

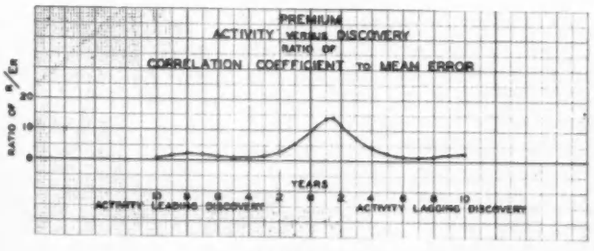


FIGURE 15

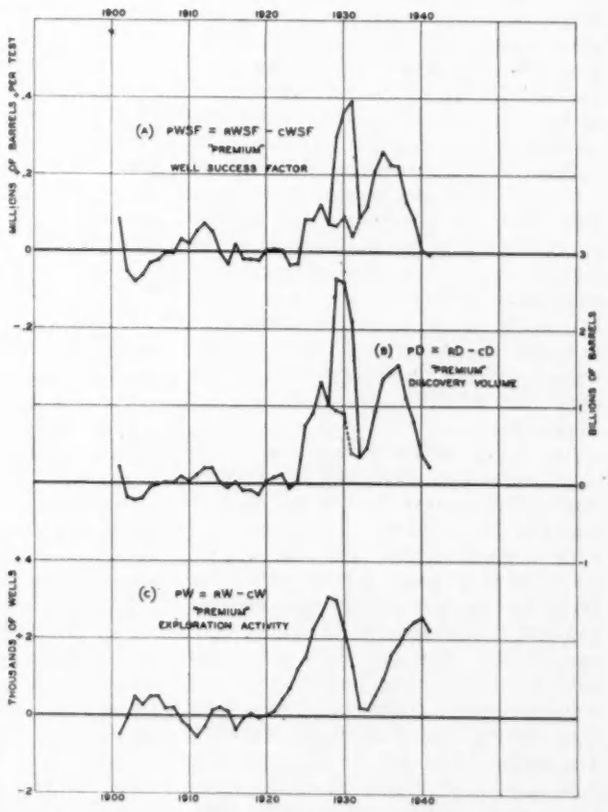


FIGURE 14

between discovery volume and activity, it was pointed out that, while activity led discovery volume in the earlier period of marginal success in prospecting, there were indications that the reverse was true in the later period of non-marginal prospecting.

The reason for this reversal in relationship can be seen by inspection of the plots for pD′ and pW in figures 14b and 14c.

After correcting pD for the discovery volume of the East Texas oil field, pD′ shows two well developed peaks which lead the two similarly prominent peaks in pW. A lead-lag study was made for pD′ versus pW, the result of which is shown in Figure 15, and which indicates that the "premium discovery volume" (corrected for the East Texas oil field) leads the "premium activity" by about 1.5 years.

Thus, while activity leads discovery volume in a price dominated period of marginal success, the reverse is true in a period of non-marginal success, for then activity follows discovery volume. That is, when technology creates an opportunity for discovery at a premium, the industry is slow to recognize that such is possible, but once that opportunity is recognized industry-wide, the resulting activity continues past the point of maximum returns (i.e., the peaks and lows in pD′ lead the peaks and lows in pW).

This reaction time for the industry was about 1.5 years for the 1925-1930 period of non-marginal prospecting, and about twice that, or about 3 years for the 1930-1940 decade of non-marginal prospecting. This indicates that the reaction time for the industry is increasing rather than decreasing.

From this, it is obvious that lack of recognition by the industry does not mean that no opportunity exists for discovery at a premium, nor does the industry-wide recognition of technology necessarily mean that the opportunity still exists in its earlier lushness. The practical significance of this reaction time is evident upon inspectoin of the plots for pWSF′, pD′ and pW in Figure 14.

For the premium prospecting which characterized the 1930-1940 decade, note that pWSF′ peaked in 1935, pD′ in 1937 and pW in 1940-1941. Thus, operators with a reaction time less than the industry-wide average (those who were active in the first half of that decade) enjoyed the advantages of higher success factors than did those operators with a reaction time greater than the industry-wide average (those who were active in the latter half of that decade). The earlier birds got the fatter worms.

Inspection of Figure 14 shows three peaks in the plot for pD (at 1927, 1929-1930 and 1937), but only two peaks in the pW plot. In contrast to the first and third peaks in pD, the second, that for the East Texas oil field, does not have a corresponding peak in the premium activity plot, pW. This indicates that the discovery of that giant pool did not make an equivalent contribution to prospecting technology, for, important as that discovery was, the industry was unable to recognize therein a rational prospecting approach (i.e., one which would lead to repetitions of that success) and so did not initiate a surge of prospecting activity comparable with the activity surges which followed the premium discovery peaks of 1927 and 1937.

Conclusions

The following conclusions appear to be justified on the basis of the data at hand, the assumptions involved and the general relationships to known prospecting practice.

Marginal Prospecting

1. When the current success factor is marginal, then price becomes the dominant factor in prospecting for petroleum.

2. Price and exploration activity then are directly related with negligible lag, and they lead discovery volume in a direct relationship by 1 to 2 years.

3. In such a period of price controlled prospecting, the well success factor is higher for higher past prices, and decreases for higher current prices.

4. The period 1901-1921 appears to have been one of only over-all marginal success in prospecting, and Figures 12 and 13 show the relationships which then held between price and exploration activity, price and discovery volume, and price and well success factor. In the absence of more recent and comparable data, these remain our best clues as to what relationships may be expected in another period of marginal success in prospecting.

Non-Marginal Prospecting

1. When the success factor is above marginal, price is not the controlling factor in exploration activity, discovery volume or well success factor.

2. In the 41 years of petroleum prospecting investigated, that which was done "at a premium" was responsible in anly about half of the total period for about one third of the total discovery volume and required the drilling of only about one sixth of the total wells.

3. When technology creates an opportunity for discovery at a premium (i.e., a repeatable approach to discovery attended by a success factor above marginal), the industry exhibits a definite reaction time. This has been as short as 1.5 years and as long as 3 years, and, from the two available determinations, appears to be increasing rather than decreasing.

4. This reaction time causes a slow pickup of activity after the technological opportunity exists, and a later over-run of activity beyond where the opportunity begins to wane.

5. The peak success factor (for such a technological opportunity) leads the peak of maximum returns, which, in turn, leads the peak of exploration activity.

6. Opportunity for discovery at a premium exists before it is recognized by the industry, and wanes before the peak of industry-wide recognition.

7. Prospectors with a reaction time less than the industry-wide average operate with a success factor greater than that for operators with a reaction time greater than the industry-wide average.

The Existing Situation

1. At the present time, prospecting for petroleum within the continental United States is in or is approaching a time when only an over-all marginal success factor can be expected.

2. Failing a strike such as the East Texas oil field in 1930 (and no price foundation for such a strike is shown in the multiple relationships illustrated in Figure 6), the discovery volume required to compensate for current withdrawals from warehouse stock can be expected to follow only from one of two courses of action, as follows:

(a) A material increase in the price of crude oil, of the order of magnitude indicated in Figure 12,* or

(b) A material contribution from prospecting technology, comparable in magnitude with the introduction of the reflection seismograph in 1930. (Such a contribution from technology could take the form of a new prospecting objective achieved, a new province established as productive, or a new method reduced to practice.)

In an economy straight-jacketed by war-imposed restrictions upon manpower, materiel and time, it should be obvious that the only practical solution lies in regaining the technological initiative. Our immediate objective should be a renaissance of discovery at a premium through opportunity created by technological advance. Thereby we can hope to repeat the performance of the latter half of this 41-year period, when about one third of the total discovery volume required the drilling of only about one sixth of the total wells.

The writer gratefully acknowledges the material assistance in computation, drafting and constructive criticism from Messrs. H. J. Jackson, R. M. Langely, and I. J. Fenn.

* On the basis of the relationships indicated for the earlier period of marginal success in prospecting, when price was the dominant factor in discovery volume, the price increase which was recently recommended (35 cents per barrel) can be expected to result in an inadequate increase in discovery volume.

Determining Probability of Success Of Secondary-Recovery Operations

PART 9

Electrical Model Studies of Secondary-Recovery

By WM. L. HORNER,
Leader of the Standing Subcommittee on Secondary-Recovery Methods

USE of electrical models is an established practice for cycling operations and has been applied to a lesser extent for water flooding. A considerable range in the types of apparatus can be used in these electrical studies, the choice of procedure depending upon the accuracy desired and the nature of the study. It is believed that electrical models eventually will become useful in making studies of individual well behavior and in three dimensional problems of secondary recovery.

This article is part of a symposium on secondary recovery presented at the annual meeting of the American Petroleum Institute, Division of Production, on November 9, 1943, at Chicago. The symposium consisted of 10 papers. Other papers will be published in future issues.

THE shape of the area within the reservoir swept by an advancing front of the fluid injected has long been of concern to the operators of secondary-recovery systems. It was probably recognized early in the history of waterflooding that the location of input wells influenced the efficiency of flooding. Wells drilled in the wake of line drives in the Bolivar-Richburg, New York, area were found to be water productive and incapable of producing oil. However, a number of wells in Bradford, drilled between input wells of nearly-depleted five-spot floods, were profitable producers. Evidence that the rate and amount of recovery can be influenced by the well pattern led to research that has yielded significant criteria for planning, evaluating and controlling secondary recovery.

At the present time it is necessary to conserve materials and labor by making maximum use of old holes and to locate the new wells for maximum profitability. A brief review of the methods and application of electrical models to these problems may be found of interest in connection with planning and evaluating secondary-recovery installations. It is also believed that greater recovery and efficiency can be achieved in some operations by use of data from model tests to guide the injection and withdrawal schedules from individual wells. The shape of decline curve and also the area and shape of the unswept portion of the reservoir can be modified by adjusting the volumes of withdrawals and injection.

The subcommittee appointed a special study group to report on the assigned subject. Membership of the group consists of individuals having records of cases where electrical models were applied to injection systems for water flooding, gas recycling and pressure maintenance and cycling as applied to production of condensate. In the time allowed for the group a certain amount of data have been obtained which do not appear in the literature. This material is presented in abstract form and is accompanied by a bibliography, listing for the first time all references believed to be related to the development and use of electrical models. The electric analyzer developed by W. A. Bruce for pressure predictions is not considered to be within the scope of topic assigned to this study group. The analyzer, however, is considered to be a valuable tool in the study of reservoir behavior and is to that extent related to problems of secondary recovery.

Electrical models which have been used in secondary recovery, including cycling, include two principal types:

(1) Electrolytic or ionic

(2) Conductance (electronic)

although it is usually possible to compute the data which can be provided by the use of these models, they are often found convenient and rapid. The electrolytic model in particular is well suited for demonstrations of the progress of injected or encroaching fluids through oil and gas reservoirs. Photographs showing the progressive advance of injected fluids have been proved effective means for predicting the shape and efficiency of injection progress and for locating unswept areas which may be produced. Quantitative use of data from electrolytic and conductance models have been used to calculate decline curves for injection operations. In several instances the encroachment of injected fluid has been determined by field measurements and these data together with production decline curves have been checked against results of electrical-model studies. One case history of this kind applied to cycling operations in the Grapeland field, Texas, is expected to be presented to the Institute in the near future, but is not available for the present report of the study group. Electrolytic and conductance models have been used for evaluating recoveries and for locating wells and planning injection-withdrawals schedules in a number of other cycling operations in condensate fields including Stratton, Agua Dulce, La Gloria, La Rosa, and Katy in Texas, also Erath and Cotton Valley in Louisiana.

The bibliography to this report also refers to the use of electrolytic models in connection with studying artificial water drive "Possibilities of Secondary Recovery for Oklahoma City Wilcox Sand."

Investigations by the Bradford District Research Group have been made in connection with the application of electrical models to flow problems. It is

significant that electrolytic and electrical models first introduced to the petroleum industry for water-flooding studies have been used to a much greater extent in gas-condensate cycling operations. The general acceptance of electrical models as a necessary tool in connection with cycling is believed due to the following: (1) Input and output wells to be drilled can be located so as to allow the dry gas to sweep most efficiently over the maximum area; (2) injection and withdrawal volumes required for maximum areal efficiency can be guided by the laboratory results; and (3) the rate of decline in richness or condensate content can be forecast.

On the other hand, water flooding is usually practiced on a five-spot, seven-spot, line-drive, or some other well pattern, the efficiency of which has already been reported in literature. The majority of water flooding projects have been five spots. Wyckoff, Botset and Muskat[1] showed that for the five-spot pattern 72 to 78 percent of the total area in homogeneous media would be flooded out at the instant water first reaches the output wells. In the inverted seven-spot this area was found to be 82 percent. In any instance flooding is continued to an economic limit. The area covered by the flooding medium at the time production ceases is of greatest significance. The shape of the decline curve between the time water first appears in the output well and the economic limit would therefore be highly significant for calculations of the economics of secondary recovery. Assuming uniform permeability and complete flushing, the percentage of injected fluid produced has been found proportional directly to the total angle subtended at the output well by the cusp of injecting fluid. For instance, when 30 percent of the circumference of a well remains fed by oil the same percentage of oil will be produced provided viscosities and relative permeabilities are equal.

Included in the bibliography are several papers[2, 3, 4, 5, 6] which are believed to include all of the source references known. The body of this report contains abstracts of the contributions which have been received from members of the study group.

The Theory of Electrical Models

Introduction:

The importance of electric models in petroleum engineering lies in the analogy between the flow of electricity in homogeneous isotropic conductors and the flow of fluid in a homogeneous isotropic porous medium.

In order to present the analogy and the theory involved in our use of electric models, it is necessary for the completeness of discussion to develop a certain amount of mathematical analysis. It is, however, not entirely necessary for the actual use of electric models in reservoir-engineering problems. The theoretical discussion will be confined to the next three subsections.

Physical and Mathematical Relationships:

The law of the flow of electricity, Ohm's law, is expressed by the equation:

$$I = -\frac{1}{\rho}\ \frac{\delta E}{\delta x} \qquad (1)$$

in which I is the current flowing through the unit of area of a section whose specific resistivity is ρ, and across which there is a voltage gradient $\delta E/\delta x$ (x is normal to the area).

The law of the flow of fluids through porous media, Darcy's law, is expressed by the equation:

$$V = -\frac{k}{\mu}\ \frac{\delta \rho}{\delta x} \qquad (2)$$

in which V is the rate of flow of a fluid whose viscosity is μ, through a unit area of a section whose permeability is k, and across which there is a pressure gradient, $\delta\rho/\delta x$ (x is normal to the area).

These two laws are identical when $1/\rho$, the reciprocal of specific resistivity, is made numerically equal to the ratio of permeability to viscosity. In this case fluid flow is directly comparable to current flow, and electric potential is directly comparable to pressure; however, in solving a fluid-flow problem, the compressibility of the fluid must be considered, while in the electric case, in which electricity is likened to a moving fluid, the compressibility of the electricity is zero.

By virtue of the apparent incompressibility of electricity, Equation (1), can be combined with the equation of continuity for an incompressible fluid. The form of this law of continuity expressed for the flow of electricity would be:

$$\frac{\delta I}{\delta x} + \frac{\delta I}{\delta y} + \frac{\delta I}{\delta z} = 0 \qquad (3)$$

The result of a combination of Equations (1) and (3) is:

$$\frac{\delta^2 E}{\delta x^2} + \frac{\delta^2 E}{\delta y^2} + \frac{\delta^2 E}{\delta z^2} = 0 \qquad (4)$$

This equation, which is known as Laplace's equation, pertains to the flow of electricity in a homogeneous isotropic conducting medium.

It should be constantly borne in mind that the applicability of these models to reservoir problems lies only in their ability to solve Laplace's equation and only in the particular case when there is similarity between Laplace's equation and the equation occurring in fluid flow.

The differential equation which expresses the behavior of a compressible liquid in a porous medium is:

$$\frac{\delta^2 \rho}{\delta x^2} + \frac{\delta^2 \rho}{\delta y^2} + \frac{\delta^2 \rho}{\delta z^2} = \frac{1}{K}\ \frac{\delta \rho}{\delta t} \qquad (5)$$

If the right hand side of Equation (5) becomes 0, Equation (4) and Equation (5) are analogous. This means that the flow of electricity is analogous to the flow of liquids if $\delta\rho/\delta t = 0$, or if $1/K = 0$. (Compressibility of the fluid is 0.)

In the case of isothermal gas flow, in which the gas observes the perfect gas law, the steady state equation is:

$$\frac{\delta^2 \rho^2}{\delta x^2} + \frac{\delta^2 \rho^2}{\delta y^2} + \frac{\delta^2 \rho^2}{\delta z^2} = 0 \qquad (6)$$

Hence, the voltage in the electric model is related to the pressure squared, and the current to average volume rate of gas flow.

Movement of Fluid:

A comparison of equations (4) and (5) provides an indication of how the electrical model is able to indicate iso-pressure lines from iso-electric potential lines, and a comparison of equations (1) and (2) shows how current or rate of charge flow is related to volume of fluid flow.

There is one further relationship now that is essential in the treatment of a certain type of problem which occurs in reservoir engineering. This is the plotting of the progress of a line or surface of marked or identified particles in the fluid as it moves from one part of the reservoir to another. The special case simulated by current being introduced at one electrode and withdrawn at another will now be discussed.

Stream lines emerging from one electrode and going to the other with each stream line always being drawn perpendicular to every iso-potential line it crosses represent the paths along which the electric charges or particles of fluid travel. At time zero, consider a group of particles forming a marked line or advancing front in the system emerging from one electrode. At any point along this line of marked particles the advance of a particle along the stream line will be proportional to the average potential gradient in the dierction of advance. This pressure gradient may be obtained graphically by measuring along the stream line the distance between successive iso-potentials and dividing the difference of potentials between these iso-potentials by the distance between them. Then after a chosen time interval Δt, the distance, Δs, that a particle has moved along a stream line is given by:

$$\Delta s = \frac{\Delta p}{\Delta s}\ \frac{k}{fv}\ \Delta t \qquad (7)$$

This form may be inverted to calculate the time interval, Δt, necessary for the

marked line of particles to take up some new position, Δs, forward. Hence,

$$\Delta t = \frac{\Delta s}{\Delta p} \frac{fv}{k} \Delta s \qquad (8)$$

The subsequent positions of a line of marked particles in this system, as the electric charges advance from the source to the sink, can be determined graphically. In the special case of a line of particles emerging from a small cylindrical electrode representing an input well and going to a small cylindrical electrode representing a producing well, the marked line of particles may be assumed to move out radially like the spokes of a wheel as they emerge from the electrode representing the input well. As long as these particles are moving out radially it is known that the potential will decrease as the logarithm of the distance from the well. Hence, the radial velocity of travel of the particles will be given by:

$$V_r = \frac{q}{2\pi bf} \cdot \frac{1}{r} \qquad (9)$$

the time of travel for the distance, Δr, is then

$$\Delta t = \frac{2\pi bfr}{q} \Delta r \qquad (10)$$

hence, the total time of travel from r_w to some radius, r, is

$$t_r = \int_{r_w}^{r} \frac{2\pi bfr}{q} dr \qquad (11)$$

$$t_r = \frac{\pi bf}{q} (r^2 - r^2_w) \qquad (12)$$

From this distance, r, outward after the stream lines indicates that the flow has ceased to be radial, the travel of a line of marked particles in the system will have to be determined graphically as described above.

Numerical Conversion from Model to Reservoir:

In every electric model, the rules for conversion of the numerical results obtained from the model in terms of volts, ohms, amperes, and distances can be made by a comparison of the differential equations involved (see equations (1), (2), (4), (5), and (6). An illustration of this will be given for the two-dimensional model.

The solution of equation (5) for pressures in such a system was developed. It is

$$p_1 - p_2 = \sum_{n=1}^{N} \frac{q'_n v}{2\pi k b_F} \log_e \frac{r_n}{r_w} \qquad (13)$$

in which q'_n is rate of liquid volume flow for incompressible liquids and $q'_n = (2q_n \times 14.7)/(p_1 + p_2)$ for systems containing a perfect gas (p is in pounds per square inch absolute). For deviation corrections super-compressibility factors may be applied to radial flow.

A solution of equation (4) for the electric model case gives

$$E_1 - E_2 = \sum_{n=1}^{N} \frac{i_n \rho}{2\pi b_E} \log_e \frac{r_n}{r_w} \qquad (14)$$

In the two-dimensional model the distances, r_n and r_w, are always in the form of ratios; hence, the distance scale is linear and electrodes in the model are placed in the same relation to each other as corresponding wells in the field.

The resistance, $R_E = \rho/b_E$, is then measured in ohms and compared with the fluid resistance, $R_F = v/kb_F$. The scale ratio of these is

$$n = \frac{R_E}{R_F} = \frac{\rho/b_E}{v/kb_F}$$

Next a ratio between potential difference in volts and pressure difference in pounds per square inch is chosen. This ratio is

$$m = \frac{p_1 - p_2}{E_1 - E_2} \qquad (15)$$

These two ratios, m and n, automatically fix the ratio of current, i to fluid flow, q, in the following equation:

$$n\,m\,i = q' \qquad (16)$$

Types of Models

General Types:

Most work has been divided into two general classes, (1) electronic conduction and (2) ionic conduction.

Examples of electronic conductors are thin metal sheets, carbon paper, graphite, and other solid conductors and depend upon the movement of electrons through the solids. In these models, electrons are introduced at one boundary and move into the model to displace free electrons throughout the entire body of the model. This causes electrons to move out of the model at the other boundary and produce a flowing current. The flowing current produces a potential drop in accordance with Ohm's law, as defined in equation (1). The ionic type model, such as salt water or salt solutions in gels, depends upon mobility of ions through the medium. Ions are moved into the model across one boundary. These displace ions throughout the entire medium and this displacement causes ions to leave through another boundary. The flowing current and the potential drop are established in exactly the same way as in the electronic models.

Monel (A.C.) and (D.C.):

Sheet Monel makes a desirable material for the conducting medium to represent problems of fluid flow in thin uniform sections of permeable medium. Wells can be represented by drilling small holes and inserting round electrodes in the Monel. Outside boundaries from which fluid is to flow can be represented by heavy copper bars. The Monel can be obtained in sheets .018-inch in thickness. It is easy to cut and bend into shapes and it does not become tarnished.

Even with its high resistivity, work with the Monel model must be done with a current of the order of 25 to 50 amperes if low sensitivity measuring instruments are to be used. A typical setup with a Monel model is illustrated in Figure 1. It is operated as follows: A low-voltage transformer furnishes current at about 20-30 amperes to the model; one side of the transformer is connected to the well and one side to the outside bus bar of the model. If a number of wells are considered, they are arranged so that the current to each well would be controlled by short sections of resistance wire. The constant voltage lines are plotted with the aid of a low resistance A.C. galvanometer, of which the sensitivity is about one microampere per mm. Potential gradients are also determined by two probes of this galvanometer. These probes are separated by a constant distance and the potential gradients are measured in millimeters deflection per millimeter electrode separation.

A D.C. Monel model can be made in about the same way as the A.C. model. A heavy-duty two-volt cell must be substituted for the transformer and it is necessary to use a D.C. galvanometer for the iso-potential plotting. A galvanometer with a sensitivity of about one microampere per division has been found to be convenient for this work.

Gel Models:

Gel models can be made by putting small amounts of NaCl or $CuSO_4$ in reclaimed Ditto jelly. The warm jelly is poured into a mold or is cut into the desired size and shape from a large mass of the congealed jelly. The electrodes to represent the influx of the fluid into the area are made from metal and most easily introduced into the gel by heating the electrode and allowing it to melt its way into place.

The gel models have two main advantages: (1) they can be shaped and formed in any way desired, and (2) beds or zones of different permeability can be simulated with them. The latter effect can be achieved as follows: If a zone in the reservoir is known to have a different permeability than the rest of the reservoir, a zone in the model to represent this part of the reservoir can be cut out of the jelly. Other gel can then be made up with suitable salt concentration to represent the different permeability and poured into the hole cut out of the model. The flow of electricity in the model when it is modified in this way is exactly analogous to the flow of fluid in a reservoir when it is in a zone of different permeability.

It is further possible to make up a gel model in such a way that the vertical

and horizontal permeability are different without having to make the vertical permeability zero. This is done by making up the gel in two different salt concentrations, for instance, one batch of gel can be made up without any salt and the other with .1 normal. These two gels are poured into separate flat trays to a depth of about ¼-inch and cooled with the aid of ice until the material is fairly hard and tough. Sheets of the desired size and shape are then cut and laid alternately, .1 normal and plain gel. The result is a model which transmits current more readily along the bedding planes than across them and simulates a certain type of reservoir. The ratio of horizontal to vertical conductivity can be adjusted as desired. For example, 10 layers put together as described above produced a model having a ratio of vertical to horizontal conductivity of 1 to 5. In both of the last described uses of the gel model it must be remembered that ions in the gel are able to diffuse independently of the electric potential and that the useability of such a model is limited to an hour or so since after this time an appreciable amount of the ions in one part of the jelly will have diffused into other parts.

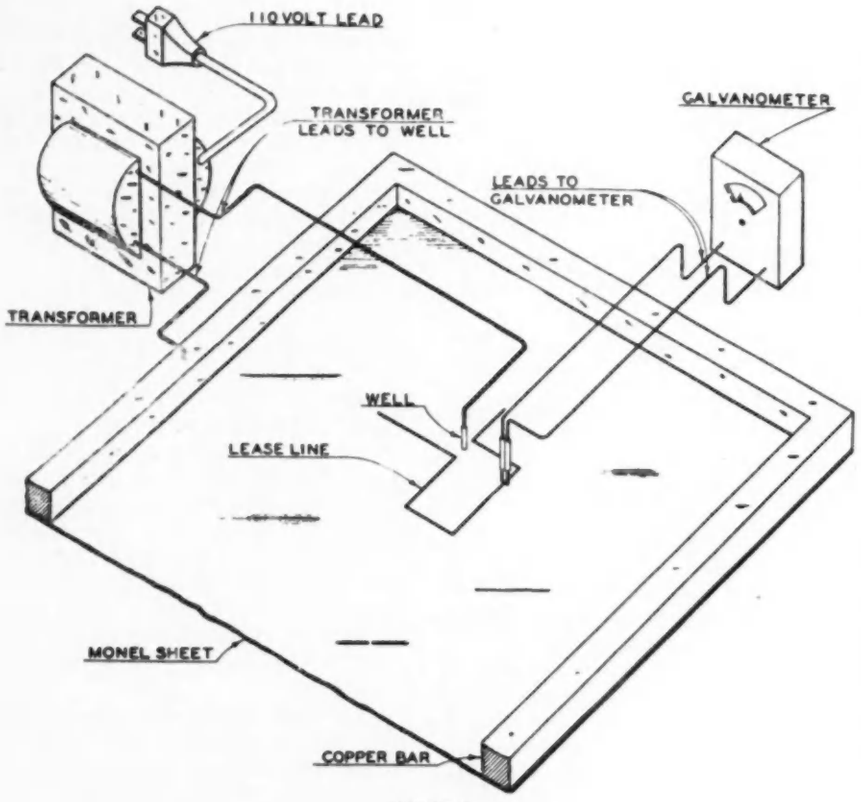


FIGURE 1
Thin sheet Monel electric model. Current is supplied to well by transformer voltage gradient by galvanometer.

Color Tracers:

An early use of color tracer models was reported by Wyckoff, Botset, and Muskat. They used an electrolyte containing phenolphthalein as an ion indicator. The electrolyte was soaked into blotting paper to keep down diffusion. The negative electrode represented the fluid source and the positive electrode represented the producing well or wells. The advance of OH^- ions from the negative to the positive electrode corresponded to the advance of a line of marked particles as described in the theory above. The advance of the OH^- ions was indicated by the presence of red color developing as soon as the pH of the system at any given point became sufficiently high to give an indication with phenolphthalein.

Swearingen and others developed the idea of using $Zn(NH_3)_4Cl_2$ in Agar. The positive electrode of the system consisted of a small tube dipping into the Agar and electrolyte and the other end of which dipped into a solution of $Cu(NH_3)_4Cl_2$ and a slight excess ammonia. The negative electrode was made in the same way with solution being $Zn(NH_3)_4Cl_2$.

The color indication in this model develops when an external potential is applied and the positive copper ammonium ions replace zinc ammonium ions in $Zn(NH_3)_4Cl_2$. The result is that a green color marks the advance of the copper ion front.

. In both of these models the purpose is to use the line of advancing color to represent the advance of a surface of discontinuity in fluid in a reservoir such as a water-oil front in a water drive or a dry gas-wet gas front in a gas injection project. The fact that a color advance in these color tracer models is a discontinuity surface in ion concentration has nothing whatever to do with the actual surface of discontinuity in the reservoir other than that the advancing color front in the electric model behaves almost as though the color front were a line of marked particles advancing in a perfectly homogeneous ionic system and that the surface of discontinuity in the reservoir behaves as though it were a line of marked particles advancing in a single-fluid homogeneous system. In the case of the reservoir the phenomena at the surface of fluid discontinuity which cause the actual behavior to be different from the single-fluid case are entirely different from those phenomena taking place at the color line of ionic discontinuity in the electric model so that the electric model, instead of being closer to the fluid case, is likely to have an additional error introduced as a result of the chemical processes going on at the line of chemical discontinuity in the gel or the blotting paper.

These difficulties mentioned here concerning the use of color tracer models would probably not be insurmountable with the limits of accuracy desired if it were not that in most of these models there is the added factor of diffusion (other than that induced by the electrical potential) through the gel or the blotting paper so that after some time has elapsed the edge of the advance of the color front becomes very fuzzy. Altogether these types of models have been found to be less desirable than any of the models considered.

Low Conductivity Water and 110 A.C. Models:

Probably one of the most convenient and usable electric models is the one using low conductivity water, usually ordinary city tap water or distilled water, made up to about 5000 ohm-cm. resistivity and a potential source of 60-cycle A.C. of the order of 25 to 100 volts. The water is put into some kind of flat-bottomed container, usually made of Bakelite or wood. The electrodes used to represent wells are best when made from ¼-inch chromium-plated brass rod. The outer electrodes are made from copper sheets or thin stainless steel strips. The potential measurements are made with a traveling electrode and a vacuum tube voltmeter. The geometric location of isopotential lines is facilitated with the plotting of the electrode position in terms of a coordinate system; i.e., the

probe for measuring the iso-potentials is arranged in such a way that its position can always be expressed in terms of rectilinear coordinates and the corresponding potentials can be plotted on any scale graph paper. An actual model constructed along these lines will be described in connection with a gas-injection problem.

A Cycling Model

The problem assumed is that of a gas injection project in a large field. The problem is confined to one input well and four producers.

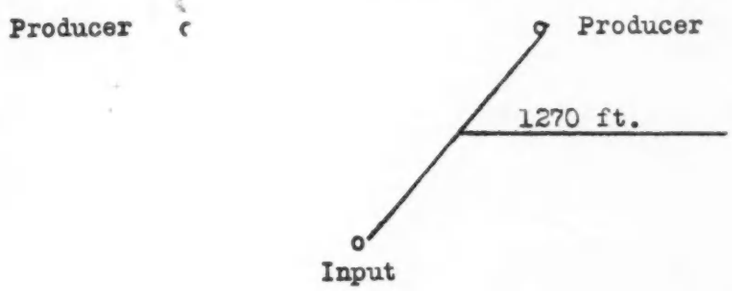


FIGURE 2

The conditions in this assumed problem are:

$k = 20$ md. $= .127$ cu ft./day units
$v = .02$ centipoise
$b_F = 311$ ft.
$f = 15\%$
$r_w = \frac{1}{4}$ ft. (well radius)
$p_m = 3500$ psi (average pool pressure)

The model conditions chosen were 1 inch equals 254 ft, $b_E = 2$ inches, electrode size $= 1/16$ inch radius.

The determination of resistivity, ρ or the electrical resistance, $R_F = \rho/b_E$, can most easily be done in the model with the meters to be used in the model work. This procedure tends to eliminate any errors due to inaccuracies of the meters. The details of the experiment are as follows: A clean, stationary electrode is supplied with input voltage. Output voltage is applied to the moving electrode and the vacuum tube voltmeter is connected to these two electrodes. All other electrodes are switched out of the circuit, though they need not be removed from the model. The voltage is adjusted until some convenient readings of the input and output meters are obtained. These readings should be identical and differences represent the error of the meters. One meter is arbitrarily chosen as the reference standard. In experiments so far, 50 milliamperes has been satisfactory for the current.

The movable probe is now moved from one cm. past 10 cm. in about 20-30 steps. At each step the distance between the centers of the electrodes is recorded as d. The current is adjusted to the original value and the voltage of the vacuum tube voltmeter is recorded as ΔE. Then plot ΔD along the linear scale and d along the logarithmic scale of semi-log paper. (Figure 3.)

Since the formula expressing E_1 is

$$\Delta E_1 = \frac{i\rho}{2\pi b_E}\left(\log_e \frac{d}{r_1}\right)$$

in which r_1 is the radius of the fixed electrode and

$$\Delta E_2 = \frac{i\rho}{2\pi b_E}\left(\log_e \frac{d}{r_2}\right)$$

in which r_2 is the radius of the movable electrode, the total potential drop between the electrodes is

$$\Delta E = \Delta E_1 + \Delta E_2 = \frac{i\rho}{\pi\, b_E}\left(\log_e \frac{d}{\sqrt{r_1 r_2}}\right)$$

or

$$\Delta E = \frac{2.303\, i\rho}{\pi\, b_E}(\log_{10} d - \log_{10} \sqrt{r_1 r_2})$$

Thus, on semi-log paper a plot of d versus ΔE for i constant should give a straight line whose slope is $(2.303\ i\rho)/\pi b_E$. Hence,

$$\frac{\rho}{b_E} = \frac{(\text{"slope"})\ \pi}{2.303\, i}$$

The slope of this curve determined for the present experiment was found to be 35.6 volts for 1 cycle, substituting this value in the above equation.

$$R_E = \frac{\rho}{b_E} = \frac{35.6 \times 3.1416}{2.303 \times .0575} = 845$$

From the conditions above $R_F = v/kb_F = .02/(.127 \times 311) = .000506$.

Then the scale factor, $n = R_E/R_F = 845/.000506 = 1.67 \times 10^6$.

The relation between voltage and pressure was arbitrarily chosen at 1 to 1. Hence, the factor m equals 1, and the relation between current and rate of flow is

$$n\, m\, i = q \cdot \frac{14.7}{p_m}$$

or

$$q = 1.67 \times 10^6 \times 3500/14.7 \times i = 3.98 \times 10^8 \text{ cu. ft./day/ampere}$$

The current in the input well was held at 48 milliamperes during the test; hence the input rate was

$$q = 3.98 \times .048 \times 10^8 = 19.1 \text{ million cu. ft./day}$$

or

$$q' = \frac{19.1 \times 14.7}{3500} \times 10^6 = 80{,}220 \text{ cu. ft./day}$$

An iso-potential diagram determined as indicated above is made. These potential lines are also pressure lines, because the factor, m, was taken as one. For maximum accuracy corrections must be made at the input and producing wells for electrode size. In this particular case, these corrections are small and may be neglected.

The positions of the wet-dry gas interface calculated according to Equation (7) at the various times are indicated on Figure 4.

The areas, A_1, A_2, etc., swept out during the various time intervals, t_1, t_2, etc., may be used to check the accuracy of this method.

$$q' = \frac{A_1 f b_F}{t_1} = \frac{A_2 f b_F}{t_2} = \ldots = \frac{A_n f b_F}{t_n}$$

where t_n is the time when the first injected gas reaches the first producing well and is equal to the time required for a particle of gas to travel from the input to the producing well along the shortest stream line (in this example, stream line A, $t_n = 2340$ days, hence $q' = 79{,}000$ cu. ft./day).

Until the injected gas reaches the producing wells, the wet gas production is equal to the injected gas. Thereafter, the wet gas production rate is equal to the area swept out times the effective thickness, $(b_F f)$/time (Figure 5).

Application to Cycling

The general acceptance of the use of models in cycling can be illustrated by the following information offered by the manager of a corporation experienced in cycling:

"Our method of using the electrolytic model consists of determining the areal extent of the sand which is mapped with contours of known scale. The well pattern is generally tried, using the wells that are available from developing the sand pattern. The electrolytic models are run, determining the rates of production and injection from various wells to determine a combination of wells in a pattern to give the maximum return from the reservoir. Electrolytic-model runs are correlated against sand thickness from the isopach maps. The potentials of the

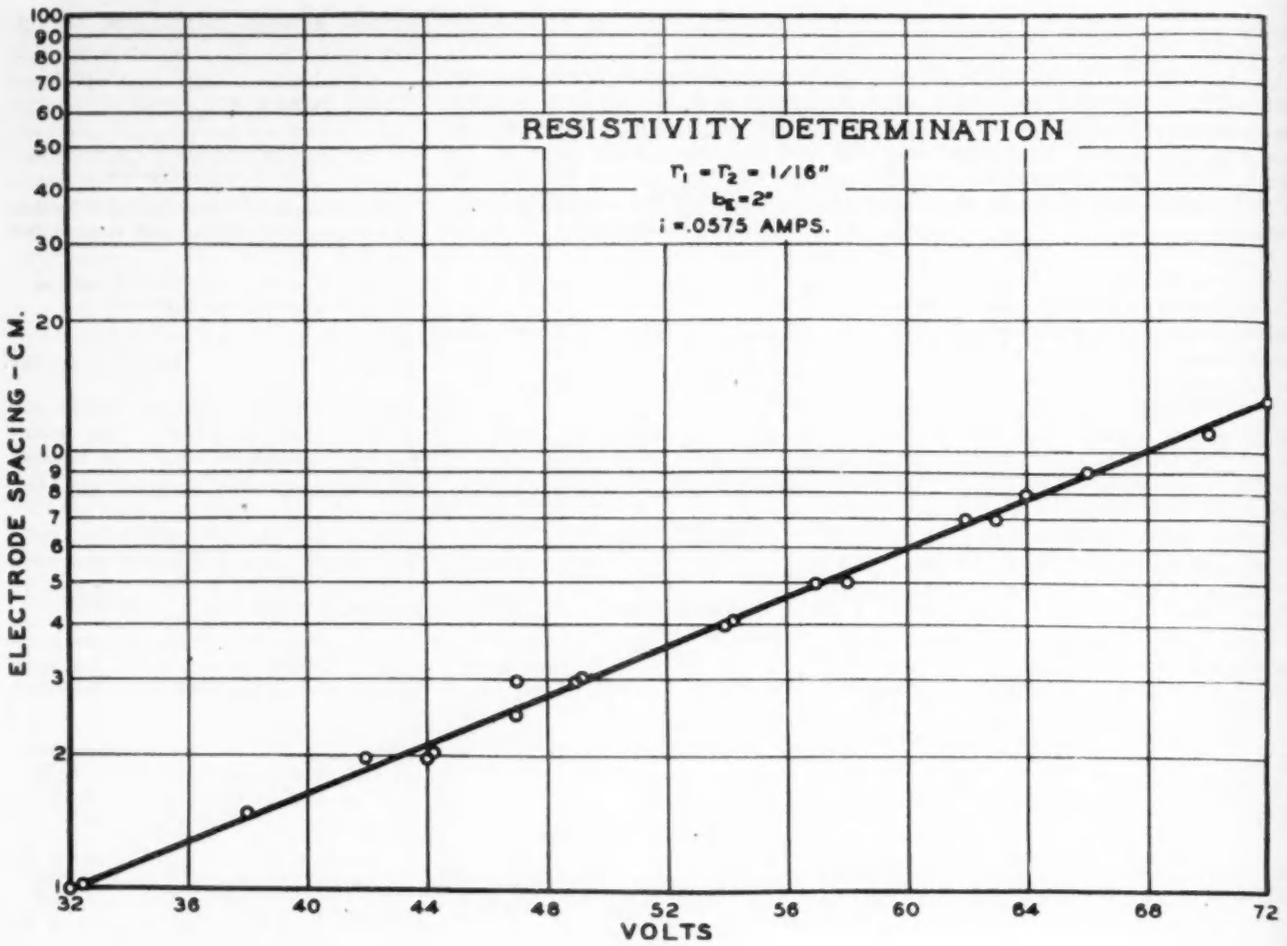
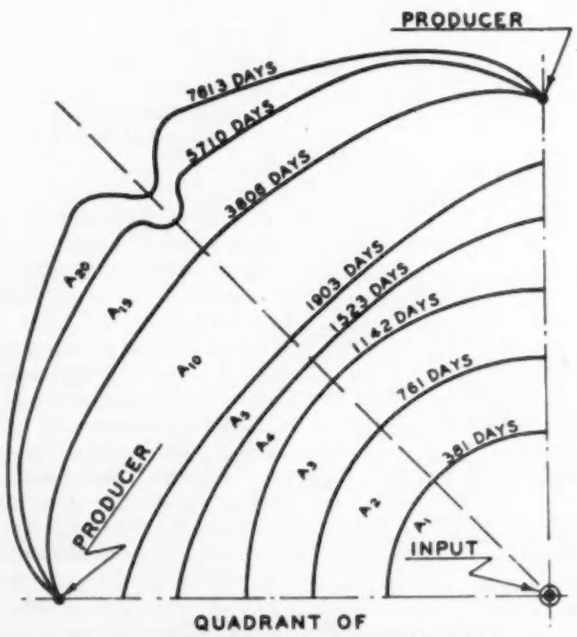


FIGURE 3

various producing wells are considered as a ratio representative of a percentage of the total contents of the reservoir. As various wells go dry on the electrolytic model, they are removed from production and the model thus indicates when all the sands have been completely cycled. From areas shown as not cycled on the electrolytic model pattern, we can determine the percentage of efficiency and if sufficient area is shown as not being cycled in the pattern, we use another well in what would appear to be a suitable area on the electrolytic model and again make determinations to see how much additional production can be obtained from such additional well, when drilled. From these data, the cycling pattern is established and operations are started in the reservoir.



QUADRANT OF
AREAS SWEPT OUT BY DRY GAS

FIGURE 4

"While we have not as yet completely cycled any reservoir dry, we have obtained figures indicating the efficiency will generally run from 60 percent to 80 percent depending on various conditions in the sand body, such as porosity and permeability. These figures are obtained from the gas-production and injection volumes which, when correlated with the electrolytic model pattern giving due consideration to porosity, sand thickness and permeability, as well as connate water, provide a basis for estimating the quantity of gas that could be injected before a producing well goes dry. In practice, it is generally found that the well goes dry when a quantity from 60 percent to 80 percent of the production is obtained from the well that would have been anticipated from the theo-

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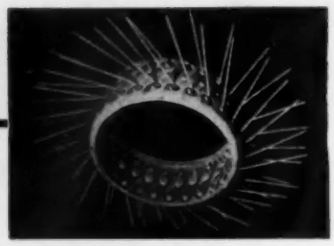

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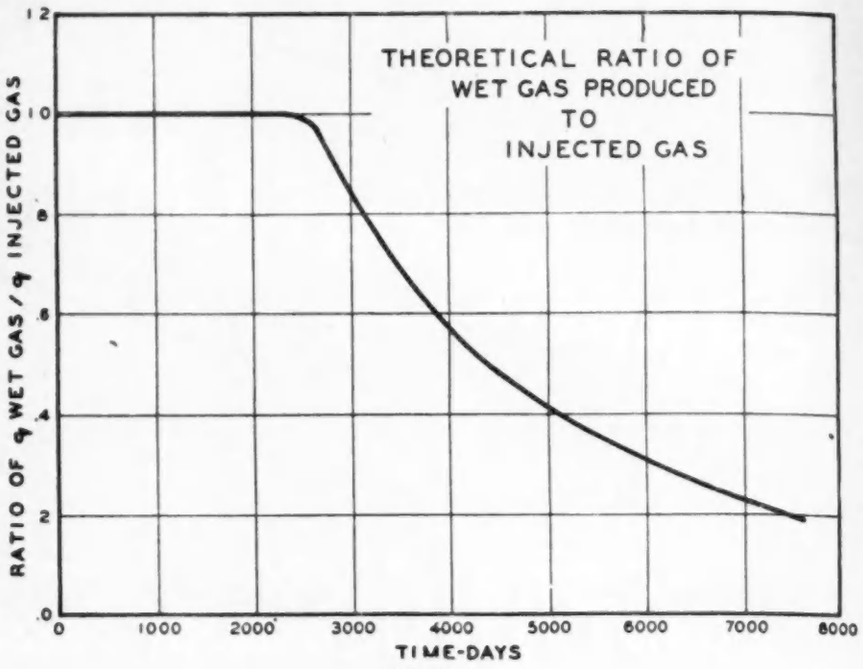

FIGURE 5

retical calculations. There are obviously many factors responsible for errors in such calculations and because of the comparative newness of these operations, we are not, at present, in a position to give any reliable data to substantiate many of the various theories that can be advanced.

"Perhaps one of the principal reasons for difficulties in cycling operations is that the well pattern is generally so wide spread that a true picture of the sand conditions cannot be estimated across the entire body of the sand. Even though this condition is true, we still consider the electrolytic model as a yardstick upon which cycling operations may be predicted, if the sand conditions and patterns are approximately the same as those assumed for the electrolytic model."

Summary

The use of electrical models is an established practice for cycling operations and has been applied to a lesser extent for water flooding. The papers by Yuster and Todd describe applications of models to development problems. Their work should be found of considerable practical value in connection with utilization of old wells in the development of secondary recovery systems.

In studying the report of this study group and in reviewing the references contained in the bibliography, it will be noted that there is a considerable range in the types of apparatus that can be used for electrical model studies. With little modification, the technique described by Wyckoff, Muskat and Botset can be simplified to the extent that experiments may be performed on an office desk using a common "B" battery and blotting paper. Elaborate equipment costing upwards of $2000 has been used for the same purpose, and choice of the proper procedure should depend on the accuracy desired and nature of the study.

It is believed that in the future electrical models will also become useful in making special studies of individual well behavior and in three dimensional problems of secondary recovery.

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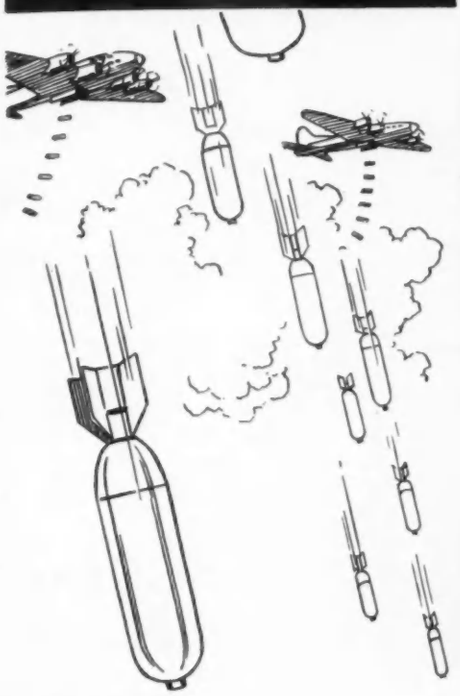
It Takes POWER



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1. GAUGES

Shields for Fittings Protect Installation

Heavy pipe sleeves, welded to tank shell, span valves and fend off accidental impact.

PROTECTION for the relatively light fittings welded to the tank or separator to carry the gauge-glass and attendant valves is afforded by splitting longitudinally a short nipple of 3-inch pipe, welding one end of each shield thus formed to the tank shell outside the gauge-glass fitting.

Cutting a small hole through these shields at the spot affording access to the removable plug permits a new glass to be installed or the plugs serviced, the sweep of the pipe being sufficient to permit unscrewing of the fitting when it must be removed.

Such a pair of shields protects the entire gauge set-up from most of the injuries normally sustained by it from falling bodies, and tends to divert traffic far enough from the tank so that the glass is likewise protected from lateral blows.

The horizontal edges of the shield are so set as to allow proper accees to the stuffing box nuts for adjusting the gauge-glass packing without cramping the wrench arc.

2. RIGGING-UP

Timber Reinforcing Saves Derrick Steel

ON DERRICK-EQUIPPED wells which are pulled by a truck-mounted unit, difficulty is often experienced in securely anchoring the unit bed to the floor girder. Not only does a heavy strain on the pulling line tend to bend the girder upward, thus weakening that member, but the grip of the anchoring chains is none too tight, as the steel section deforms and it unnecessarily bends the material until it is unfit for further use as a derrick member should the structure be used on another well.

To remedy this situation, one company utilizes two inexpensive ideas that have since been helpful in speeding up pulling jobs as well as conserving the steel derrick floor member. First, a hold-down made of two short sections of heavy sucker rod was anchored in the center of the beam and cinched down as shown in the photograph. Next, two heavy 12x12-inch timbers were cut to the proper length to permit them to be swung up and under the bottom side of the beam, then pulled up tightly in place with heavy wire.

When the pulling unit is now backed up in place, the hold-down chains can be thrown around the frame and pulled down as tightly as desired. Not only is the beam more rigid, but the soft wooden beams provide a "bite" for the chains and a much more firm and secure base for the pulling unit is provided.

3. HAND TOOLS

Seamless Tube Grips Extend Wrench Use

ONE of the most common tools used in production pipe fitting is the snipe, a necessity in every tool box. The mechanics of one producing company, tiring of carrying heavy lengths of pipe around wherever they moved in the field, have adopted the practice of equipping all their larger sizes of wrenches with permanent extension handles.

Instead of using heavy pipe, however,

Lifting tendency of servicing rig snubbed by central tie-down and location of timber sills to provide gripping surface for chain ties. Full section of steel provides maximum rigidity.

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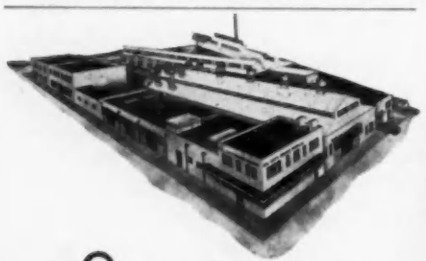

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Wrenches rejected because of bend or broken handles are fitted with long tube handles, brazed in place and designed to permit application of maximum torque for jaw opening.

they secured lengths of high tensile strength tubing used in certain types of deep-well pumps—tubing which was no longer fit for service as a pump. Closed at one end with an orange-peel weld, the light weight tube is slipped over the handle of the wrench and brazed in place, after first shaping the tubing around the wrench handle to make it more nearly conform to the contours at that point. Wrenches so equipped were usually those whose handles had become permanently deformed or broken, and which were cut off to allow the new handle to be slipped over the shortened shank.

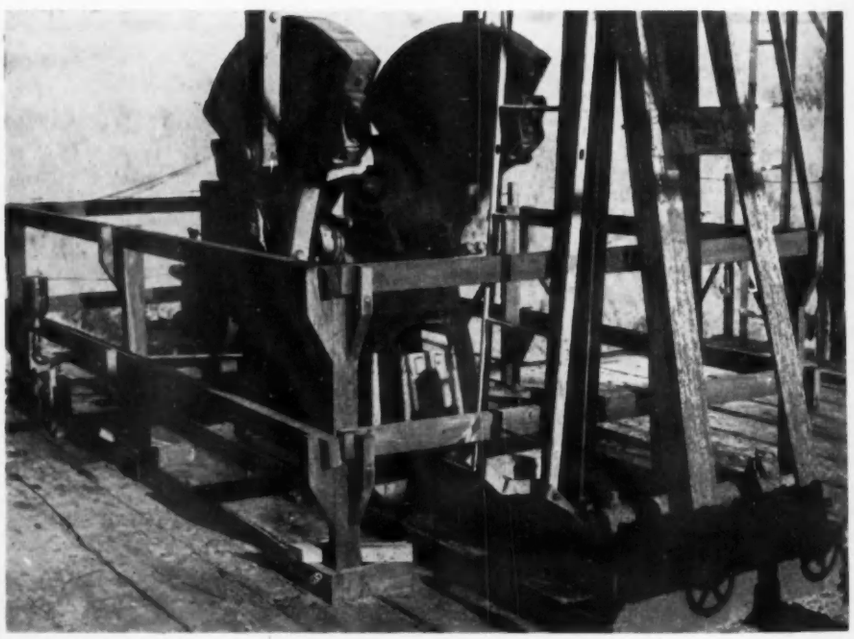
So long as they are used by mechanics who know the limits to which pressure should be applied to fittings requiring this size wrench, the handles are very long lived, and due to their very light weight, are much liked by the field men, since a 36- or 48-inch wrench now weighs little more than a 24-inch size. Not only does it facilitate and speed up field work, but old wrenches may also be salvaged for still more service when new ones are difficult to obtain.

4. ENCLOSURES

Demountable Guard Replaces Steel Unit

BORROWING from the fencing problems of a home-owner, one major company now builds neat-appearing, practical wooden fences around their pumping units. Now that small sizes of piping and even sucker rod materials are much too valuable to expend for this purpose, it is necessary to resort to wood, and the efficient enclosure shown in the photograph is an example of what can be done.

Made up in the company shop, the various sections are cut to size, painted, and later assembled at the well site. The notched supports in the corner and midway posts are held to the uprights by long carriage bolts and provide ample strength to carry the horizontal 2x4 bars. The corners are held in place on the well floor by several short 2x4 blocks nailed in position so they will not skid.



Safeguarding the pumping unit is through a wood fence or pen, carried in floor sockets, and with individual horizontal members removable by withdrawing securing pins at ends.

Non-Metallic Core in Storage Reel Extends Life of Welding Cables

Prevention of magnetic field formation within coil of cable found to stop premature embrittlement of wire and insulation, while simple locking devices prevent unreeling and fouling of leads as unit is dragged to the job

FREQUENT replacement of costly and hard-to-obtain electrode cables may become one of the major upkeep items on portable electric-welding units. Serious deterioration may be caused, however, by reasons other than those usually attributed to weather and scuffing of the rubber insulation. One company welder, in attempting to determine why his cables were prematurely becoming hard and brittle even though they were handled carefully and kept wound on small spools, discovered the cause to be associated with the fact that the spools had steel cores.

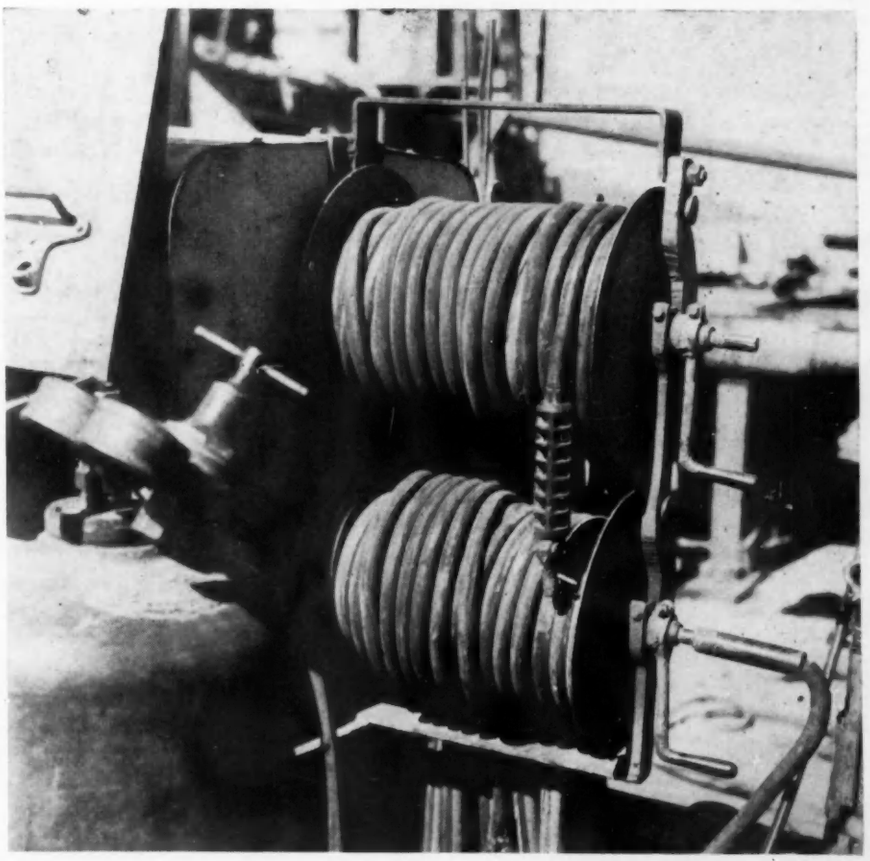
Lending weight to this evidence was the observation that the inner layers of the cable, even though much less used and seldom exposed entirely to weather, were the first to show evidence of stiffening and embrittlement. Not only did the heavy rubber insulation crack, but the copper wire itself ultimately would become brittle and eventually would break within the insulation upon being used or flexed in removing it from the reel.

Believing that the intense field set up by the direct current around the steel core in the center of the spool might be creating heat and other electromagnetic conditions causing rapid deterioration, a wooden core was turned out and mounted in the reel in place of the steel core. Almost immediately a change was noticed. The majority of the foregoing troubles vanished and the cable, since the cores were changed, now remains soft and pliable down to the last turn in the center of the reel. This prolonging of the useful life of conductor cables has been the cause of substantial savings in electric welding equipment upkeep.

Other Features

Other features of these electrode cable reels include methods of operation to conserve time in the field. A simple but efficient rack was built which carried both of the crank-wound cable reels.

Two upright lengths of ¾-inch steel plate were bolted to brackets on the unit framework and the axles of the reels were held in a horizontal position in J-slots cut out of the brackets. Friction-type terminals were installed on the end of each reel, simplifying field hookups. To secure the reels in position after the cable was wound up, a steel pin was installed in the framework in such a position that it would engage any one of four holes drilled through the outer edge of each of the spool flanges. Once the spools are locked in position there is no danger of their unreeling to tangle up the cable near the unit. This is particularly helpful while welding some distance from the unit, such as up on the derrick floor or in the cellar. When sufficient cable has been strung out, a slight strain on it while shifting it around pieces of well equipment will not pull the unwanted remainder off the reel, again fouling the cables and causing loss of welder's time.



Replacing steel core with wood protects cable against overheating, while latch buttons shown near top of each rim permit scotching of drum when required cable has been unreeled. Removable retaining bolts permit either reel to be lifted free of supporting frame if desired, while cranks improve evenness of spooling.

MISSION PISTONS

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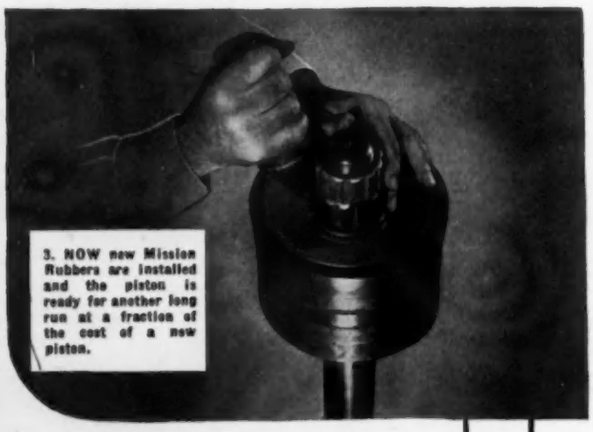
2. It's not even necessary to remove the piston body from the rod. You save on shut-down time when rubbers are changed.



3. NOW new Mission Rubbers are installed and the piston is ready for another long run at a fraction of the cost of a new piston.

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Truman Committee Report Is Highly Critical of Canol

Foreign Oil Situation to Receive Early Attention

Ceiling Prices Jumped by OPA in Certain Areas

Relaxed Restrictions May Help Production—Ickes

By B. F. LINZ,
Washington Correspondent

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PUBLICATION of a Truman committee report sharply critical of every phase of the War Department's $134,000,000 Canol venture was the outstanding feature of a week in which Washington saw little oil activity, and devoted itself principally to preparing for a busy period when House and Senate open their new semester January 10.

The attitude of the committee was expressed in a statement by Senator Homer Ferguson of Michigan who, with Senator Harley M. Kilgore of West Virginia, made a personal inspection of the Canol project. "It is most unfortunate that General Somervell ever ordered this project to be undertaken," Ferguson said. "The stubborn persistence in completing it is inexcusable. The attempt to justify it by specious arguments impairs confidence."

The week will bring the President's annual message on the state of the Union and his budget message, in which he may have something to say about new taxes, and Congress will immediately settle down to work on oil and other matters which were pending when it adjourned last month.

PIWC also will hold its first 1944 session and is expected to bear down heavily on the foreign oil situation. A special committee was set up at the last meeting to go into the subject, and will meet in Washington January 10, two days ahead of the council session, to formulate its report.

The council also is expected to discuss the DSC plan for transportation compensation on West Texas crude railroaded into District 2 and stock-piling and is hopeful of receiving a report from its economic committee, which was unable to make a formal presentation in December because of difficulties it ran into with the military authorities. Its discussion of stock-piling is expected to revolve around recent disclosures of plans for a huge post-war accumulation of foreign petroleum and other commodities, for storage against a possible future emergency.

The major developments last week were the refusal of the Supreme Court to intervene in Robert E. Lee Jordan's effort to force the Interior Department to assert title to the California off-shore lands. Jordan's appeal from dismissal of his case by the District of Columbia lower court is pending before the Court of Appeals and is scheduled to be heard within the next six weeks or two months. Meanwhile, the Department of Justice is understood to be nearing the end of an investigation which it has been making of the title to the underwater lands.

An order by PAW slightly lightened the restrictions of PAO-11 to make easier the reworking of wells in multi-zone fields.

Important Oil Matters Up for Action As Congress Resumes After Recess

The 78th Congress has returned to Washington for its final session, with a number of important oil matters due to come up almost immediately.

The major issue, and one which has an importance far beyond that which it holds for the oil industry, is presented in the Disney bill to increase the ceiling on crude oil prices, already passed by the House and now pending in a Senate committee.

Assailed by the Administration as a drive to nullify its anti-inflation program, the measure will be bitterly opposed when it reaches the Senate floor, possibly in the near future. Combined with other legislation to increase the wages of non-operating railway employees and to ban food subsidies, the bill represents the views of many in Congress that the Administration, while controlling the prices of non-agricultural commodities, has failed in its efforts to stem the rise in the cost of living by its inability or refusal equally to control the wages of labor and the prices of agricultural products.

The Lea committee is expected almost immediately to undertake a new series of hearings, at which representatives of East Coast interests will attack PAW orders and the controls imposed on the distribution of oil in that area.

Petroleum Reserves Corporation also is slated for Congressional consideration, with the hard-boiled Truman committee expected to have something to say on the plan to put the government into the oil business abroad. It is also expected to intervene if any attempt is made to carry out plans reportedly nearing completion in the Interior Department for government producing operations on the public lands.

A major question which may come up during the next few months is that of foreign oil policy generally. This issue has been raised with increasing frequency during the past few months before Congressional committees, in PIWC and in the industry generally, where it is argued that the United States must adopt a definite policy with respect to foreign oil before the war ends.

Failing such action, it is contended, American capital will be reluctant to go to distant parts of the world, where it would have to fight unaided against unreasonable demands and laws of local governments and compete for favor with foreign oil companies strongly supported by their own governments.

Prompt action also is expected to be taken on the Navy's new contract with Standard Oil Company of California for operation of the Elk Hills naval reserve. The Navy is satisfied that the new contract which has been drafted will meet all the objections raised to the original agreement entered into last November and rescinded in September, but the Department of Justice is not entirely approving of the arrangement and the whole question is due for another airing before a House committee.

There are probably two score oil bills pending in House and Senate, but practically all of them will be left unacted upon in committee files. However the major issues which have been presented will offer sufficient material to keep oil a live subject throughout the session.

PAW Not Expecting Much From PAO 11 Change

A number of the restrictions of Petroleum Administrative Order No. 11 were lifted by PAW January 1 in a move to encourage increased production, primarily in multi-zoned fields.

It was emphasized that the relaxations will not necessarily tend to increase the net productive capacity of the country, but they were planned to slow down the rate of decline in productive capacity in many fields.

The major features of the amended order provide that:

(1) In drilling on sectionalized land within two miles of any other drilling or producible well, the well shall be located on the quarter-quarter section within 150 feet of the pattern well location and at least 300 feet from quarter-quarter section lines.

(2) The minimum distance requirement between wells on 40-acre spacing is reduced from 990 to 900 feet, providing greater flexibility to operators in locating wells on the drilling unit.

(3) Unless specifically prohibited by

an exception or supplemental order, any well may be reworked or plugged back and recompleted in a shallower horizon penetrated by the well, anywhere in the United States except in California where the conditions under which wells may be reworked or plugged back are covered by Supplementary Order No. 4.

(4) Any well may be deepened and recompleted in a deeper formation if the well, with respect to the pool or pools in which it is recompleted, conforms to the quarter-quarter section or 40-acre spacing requirements of the order, except that a pattern location need not be followed.

(5) Pumping or other artificial lifting equipment may be installed on wells which have been deepened to lower formations pursuant to the order, and it may be interchanged in its entirety between wells on the same lease. Additional tubing or sucker rods may be installed on any pumping well.

(6) Condensate fields are included within a newly defined term "Restricted Area," in which the drilling of all wells must be by exception unless commenced prior to designation of the area as "restricted."

(7) Gas-gathering systems may be constructed provided the material cost does not exceed $5000 and existing facilities are not duplicated.

"The relaxation of certain restrictions on the use of material will permit oil operators to utilize critical items on a slightly larger scale than has heretofore been possible," Ickes explained. "Present conditions warrant the use of these materials, particularly in view of the pressing need for the utilization of every facility that may encourage efforts to increase the production of crude oil in the United States.

"In effect, relaxation of use restrictions will permit operators to work over their producing wells and to further develop reservoirs of oil known to exist within some of the presently productive fields."

Much Material Bought for New Aviation Gasoline Units

Engineering for the 22 100-octane aviation gasoline plants which are to be built this year to complete the government-industry $900,000,000 construction program is already more than 75 percent complete, it was announced by PAW January 4, and actual construction is under way with the purchasing of building materials more than 80 percent complete.

"By this time next year, we expect these additional plants to be completed and increasing substantially the stream of aviation fuel flowing to the fighting fronts," Ickes said, pointing out that 163 plants of varying size are now contributing to the manufacture of 100-octane. But, he added, "still we do not have all that we are going to need."

"How much 100-octane gasoline actually is being used and will be needed to win the war cannot be revealed," Ickes continued, "but it is expected that, with the added production from these plants, the volume of fighting fuel will be raised to levels adequate to meet the war demands as they now are anticipated by Allied strategists."

Truman Committee Sharply Critical of Army in Blasting Canol Oil Project

Sharply rebuking Lieutenant General Brehon Somervell for pushing the decision to undertake the Canol project without any attempt to evaluate its problems, the Truman committee on January 9 issued a report declaring that the scheme never should have been adopted but expressing doubt whether any money could be saved by halting it now.

Based on one of the most extensive investigations ever conducted by the committee, involving the sending of two members to Canada and Alaska and the holding of lengthy hearings in Washington, the report charged that after the inquiry was initiated the War Department energetically pushed work on the project, "going so far as to start filling a pipe line that will not be completed for three months" so that "it may be that by now the savings from discontinuing the project have almost completely disappeared."

The committee held that the $35,000,000 involved in the construction of products distribution lines and storage and docking facilities would have been required along the Alcan highway even if there had been no decision to obtain oil from Canadian sources, but the remaining $99,000,000 of the $134,000,000 project could not be justified.

"The War Department made no attempt to justify the Canol project on an economic basis," it was commented. "Admittedly, more oil products could be obtained in the United States quicker and cheaper and with the expenditure of less strategic materials and equipment, either by drilling new wells or by the rehabilitation of wells which have been abandoned because they could not be operated profitably at the prevailing market prices for petroleum.

"The sole justification sought to be advanced for the Canol project was military necessity, based on the military appraisal in the spring of 1942 of the war situation and the early need for oil products in the Alaskan area."

Started With Scant Information

When the Canol project was first proposed never was determined by the committee which, however, outlined and commented unfavorably upon the scanty information on which it was adopted, declaring that the recommendations made to Somervell by Colonel James H. Graham, then a part-time assistant to the general on transportation matters, "were made without a survey of the route of the projected pipe line and with no knowledge of the conditions to be met there except that mountainous terrain, muskeg, and extremely cold winter temperatures would present very difficult problems; without considering the number of pumping stations to be required and the most advantageous size of the pipe line for the purposes required; without considering the possible alternative locations of the refinery; without considering the costs and difficulties inherent in transporting the materials and men and maintaining them at the project; and without considering possible alternative methods of obtaining oil products for the Alcan highway."

Reaction to the decision to go ahead on the basis of Graham's recommendations was almost instantaneous and should have warned Somervell of the impracticability of the project, it was pointed out.

Brigadier General (now Major General) T. M. Robins commented, upon studying the directive, that ten times the volume of delivery contemplated would be made by barges available from inland United States rivers at one tenth the cost and effort; Standard Oil Company of California, engaged as expert consultant, advised that the time limit specified in the directive could not be met and proposed an alternative method of transporting products from the United States and storing them in the area.

The report pointed out that construction of that part of the project other than the distribution system will involve the transportation of about 125,000 tons of materials and consumable supplies, the use of about 65,000 tons of strategic materials and the services of about 4000 soldiers and 12,000 civilians, adding that "had the energies and facilities devoted to the Canol project been devoted to devising means of transporting and storing oil products, it would have been possible to have obtained large supplies of oil products for use along the Alcan highway many months before products will be obtained from the Canol project."

Doubt Reserves

The Senators scouted Somervell's claim that from 50,000,000 to 100,000,000 barrels of oil have been discovered, appearing more ready to accept Imperial Oil Company estimates of more than 35,000,000 barrels, but pointing out that only a portion of the oil can be obtained due to the fact that much of the structure lies under the bed of the Mackenzie River, where ice floes would destroy equipment.

However, they added, under "proper" agreements with Canada and Imperial Oil Company, the pool might be of use for military purposes after the war and possibly, if the war is very long, during the war, "providing an imperative need should be developed which would warrant the additional expenditures necessary to make such oil available for military use."

"All of this," the report stated, "was initiated and set into motion as result of an inadequate study made without seeking the advice of the War Department's own Engineer Corps or other appropriate government agencies and in disregard of the advice of informed petroleum experts."

Highly critical of Somervell's failure to seek the counsel of other agencies interested in the matter—the Navy, PAW, WPB, War Shipping Administration, State Department and Lend-Lease Administration—the report branded it as "not merely a lack of coordination, but a positive assertion on the part of one agency that the others are not concerned with an affair which is important to them.

"The committee believes that the War

Department should have sought whatever help these agencies could have given and should have kept them advised of its action," it added.

The lack of consideration of important matters which characterized the whole project was emphasized by the committee as typified by a report of the Army's own technical consultants, a few months after pipe for the 4-inch line was shipped, that if 6-inch pipe was used, requiring only 20 percent more steel, the number of pumping stations, one of the tightest bottle-necks in the war program, could have been reduced from 12 to 2. Later, the report said, 6-inch pipe was used on 100 miles of the western end of the line, because it happened "to be handy."

Brigadier General Walter B. Pyron, former Gulf Oil Corporation vice president serving as oil adviser for the services of supply, admitted later that in conducting his own business he would have consulted technically qualified experts, the report pointed out, adding that in connection with his opinion that a 4-inch line would be sufficient, "he guessed wrong."

In the construction of the refinery at White Horse, it was brought out, 7787 tons of new steel were used. Five thousand tons are required to construct a tanker with a capacity of 128,000 barrels per trip, the report commented.

"Standard of California estimates that the cost of a tanker to transport oil products to Alaska and the distribution and storage system, including 931,000 barrels of 100-octane gasoline, would have been $44,456,509," it stated. "When the White Horse refinery starts operation in the spring or summer of 1944, it will take 65 months, or more than five years, of full year-round operation to produce an equivalent amount of 100-octane gasoline.

"Mr. Graham repeatedly informed the committee that he was not interested in costs. The committee is."

Drain on Materials

All told, the committee concluded, "instead of helping in 1942 and 1943 when shipping was at its low point, the project was a drain on available transportation faciliites, to the detriment of the actual fighting forces in Alaska, which the committee knows, from its investigations in Alaska, suffered from lack of transporation for such essential supplies as lumber. At best the project —designed because of a shipping crisis— would be complete after the shipping crisis had been largely met by our tremendous shipbuilding program.

"Moreover, aside from the time element, the Canol project could not produce enough to make Alaska or even Northwestern Canada independent of outside oil products. General Somervell admitted in his testimony that Canol's product would not be a drop in the bucket during a major engagement. It would require months and years of operation without using the products for any other purpose, for Canol to stockpile any sizeable quantity of material and this on the assumption that full year-round operation is possible. Irrespective of Canol, the water lanes to Alaska would have to be kept open and the great preponderance of necessary oil products moved to Alaska by water.

"One tanker making a single trip anytime after April 29, 1942, could carry as much 100-octane aviation gasoline to Skagway as would be produced by the entire Canol project by January 1, 1945."

If the committee felt the project censurable, it was even more critical of the contracts under which it was prosecuted.

Dislikes Contract

"The War Department incurred a definite obligation to minimize its cost by negotiating contracts with Canada and Imperial Oil which would preserve for the United States after the war an interest in the project commensurate with its investment and the equities of the situation. The War Department did not even attempt to carry out this obligation until after the committee commenced its investigation."

Outlining the terms of the contract, the committee pointed out that some of the wells to be drilled will be on land belonging to the Canadian government and others on those of Imperial Oil, but with respect to neither will the United States have any right to any of the oil after the war. Further in essence Imperial is providing nothing for the $1.25 per barrel which it is to receive for oil, but the right to drill on its property, subject to its supervision, and will receive, under the provision for return of part of the purchase price after 1,500,000 barrels are taken, $1,125,000, "to return to them their 'investment' in an 'old field' consisting of five wells, two of which were dry, and which operated only a few months of the year."

"To summarize," the committee said, "the contracts for prospecting for and developing oil resources will greatly benefit Canada and Imperial Oil, but the United States will retain only the right to get whatever oil we can use in this project during the interval between the completion of the project and the end of the war."

Comparative Costs

Comparing costs on the project with those in the United States, the report contrasted the $31,017,579 for the 4-inch line laid on top of the ground to deliver 3000 barrels daily, with the Big-Inch line costing approximately $90,000,000 and delivering 100 times as much oil, and referred to estimates of Standard Oil Company of California that a refinery of similar capacity and including installation of the Houdry process could be constructed in California for $11,500,000 against the $24,429,270 required for the 3000-barrel White Horse refinery which will not have the Houdry equipment.

The costs of operating the pipe line and refinery have not yet been adequately determined, but it is estimated that the operating costs will alone nearly equal the combined costs of purchasing an equivalent amount of finished oil products in California and transporting them to Skagway," it said.

"Moreover no refinery or pipe line is worth anything commercially unless a source of oil can be obtained at a reasonable price. The only source will be Canada and Imperial Oil, and the price of the oil will be whatever they decide to charge."

The committee emphasized that the provisions of the contracts unfavorable to the United States "were not inserted because Canada and Imperial Oil were greedy." The War Department drew the contracts and "Canada simply agreed to the requests that were made upon her, and there is no evidence that Canada would not have been willing, had she been requested, to discuss this matter thoroughly and to execute a contract, or contracts, that would have given effect to the proper interests of both the United States and Canada."

As against the great expenditure for Canol, it was pointed out, the Deputy Petroleum Administrator, at the committee's request, prepared an estimate of the cost of transportation to and the storing of products at Skagway and White Horse, showing that for a capital cost of $2,601,820 it would be possible to transport and store the equivalent of two years' production.

As to the future of the project, the report said;

"The committee believes that there should be no further expenditures for prospecting and exploring for oil unless the contracts have been revised, and unless a factual determination has been made that the oil which might be found could be used soon enough to have a value equivalent to the materials and manpower required to obtain it.

"The question as to whether the balance of the project for obtaining oil products from Canadian oil should be completed should be determined by the War Department in accordance with the status of the project and its future value. The commitee believes that this decision should now be left to the War Department even though it is definitely of the opinion that that portion of the project should not have been undertaken, and when undertaken should have been stopped when the difficulties and problems became apparent."

Committee Summary

Views of the commitee were summed up in its conclusions that:

"1. The Canol project was undertaken without adequate consideration or study. The information on which General Somervell acted was deficient in the following particulars:

"(a) Inadequate technical knowledge of the probable production capacity of the Norman Wells field;

"(b) There was no study or estimate of costs which reflect use of critical materials and manpower;

"(c) The date of completion set was on its face impossible of accomplishment when examined by any experienced engineer;

"(d) There was no consideration of possible alternative methods of obtaining the same or greater supplies of oil.

"(Evidence taken by the commitee shows that practically no consideration was given any of the above factors except (a) and that consideration of that factor was not sufficient.)

"2. The period between January, 1942, and April 30, 1942, the date the decision was made to undertake the Canol project, was not fully utilized to obtain information with respect to the problems and difficulties involved, on which a competent decision could be made.

"3. Within 5 weeks after the project was undertaken the War Department was warned repeatedly of its unsoundness and excessive cost by qualified persons; there may be some slight excuse for General Somervell's original hasty decision in view of the tremendous pressure on him at the time, but his continued insistence on the project in the

face of these repeated warnings is inexcusable.

"4. The project was conceivable as a relatively quick means of providing a local source of oil products for the defense of Alaska during the specific emergency. It failed to accomplish this end. On the contrary, it was a drain upon our resources in 1942 and 1943, and it will continue to be so until it has been in operation sufficiently long to produce oil products which can make a contribution to the war effort equal to the expenditure of transportation facilities materials and manpower allocated to the project.

"5. Authority over the entire program for obtaining petroleum, both in the United States and from abroad, should be concentrated in the Petroleum Administration for War. He should have been consulted before the Canol project was undertaken. In the future, all such projects should be undertaken only at his direction, but he should consult fully with the War Department and any other agencies concerned, and should give due weight to their advice and suggestions.

"The actual construction and operations, of course, should be done by the engineering corps or such other agencies as may be appropriate.

"6. The contracts with Imperial Oil and the Canadian Government were improvidently drawn, without even an effort to obtain fair and reasonable terms from them. If the project is to be completed every effort should be made to obtain at once a revision of these contracts which will provide proper post-war rights and safeguard the interests of the United States.

"7. No portion of the $7,000,000 allocated for further prospecting and exploration work should be expended (1) unless equitable agreements can be obtained from Canada and Imperial Oil and (2) unless there is clear expectancy that some benefit can be obtained therefrom during the war equal to the cost in materials and manpower involved.

"8. The question as to whether the balance of the Canol project for obtaining oil products from Canadian oil should be completed, should be determined on the basis of whether equitable arrangements can be completed with Canada and Imperial Oil for suitable rights in the project after a determination by the War Department that the project in its present state is worth the materials and manpower necessary to complete it.

The committee is definitely of the opinion that the Canol project should not have been undertaken, and that it should have been abandoned when the difficulties were called to the attention of the War Department. The projects of this character ought to be undertaken only at the direction and with the approval of the Petroleum Administrator for War. However this project was undertaken by the War Department and has been so largely completed that only a small amount, proportionately, could be saved by abandoning it now. The committee therefore believes that the decision as to whether it should be abandoned now should be made by the War Department.

"9. The committee believes that prompt action should be commenced especially in time of war even when subsequent events prove the action to be unwise. Any intelligent action is better than none at all. But the action must be intelligent. In this case General Somervell acted quickly but he acted on the basis of a faulty and unnecessarily incomplete consideration of the project by himself and his subordinates and without consulting other governmental agencies and private concerns with oil experience. General Somervell should have required his staff to use the several months available to obtain more adequate information, and above all he should not have continued the project after the difficulties became apparent, and after expert opinion indicated that the project was not desirable."

Definite Post-War Policy Is Demanded by IPAA

A strong effort will be made at the coming session of PIWC to have the council go on record in support of adoption by the government of a definite policy on the foreign oil operations of United States nationals.

Both the special committee appointed at the last meeting to consider the subject and representatives of the industry itself are expected to demand that definite action be taken now to set the basis for post-war operations in foreign fields so that the industry may know whether it will be left to fight foreign governments and foreign competitors by itself, will have the full support of its government as do the British and Dutch companies, or will have to face the competition of the government itself.

A policy of supporting private enterprise and abstention from government operation will be urged by independents on the council, based on a strong resolution adopted last month by the directors of the Independent Petroleum Association of America.

The appropriate policy, as seen by the IPAA, calls for the government to give necessary and legitimate diplomatic support to its nationals engaged in foreign oil operations; to foster private enterprise in foreign exploration, production, transportation, refining and marketing, and to establish "a cardinal principle—that government itself will not directly or indirectly engage in foreign oil ownership, exploration, development, or operation, either in its sovereign or proprietary capacity, or through the media of ownership in corporations or other agencies engaged in the petroleum industry."

Association officers plan to submit their resolution to the PIWC committee at its meeting, January 10, and urge that a declaration of its principles be incorporated in the committee's report.

"The Independent Petroleum Association is opposed to the ownership or operation of foreign or domestic petroleum reserves by the government," it was declared January 8 by President Ralph T. Zook.

"There are no degrees or gradations possible in free enterprise in the petroleum industry.

"The independent producers recognize that through private enterprise substantial benefits have come to the people of the United States through the development of petroleum reserves in foreign countries by our nationals. In our resolution we assert that such developments have been made without the involvement of the United States government as such, and without creating the hostility of friendly nations through the attempted impairment of the sovereignty by the intervention of the United States government in their internal affairs.

"It is our desire to see that policy of non-intervention continued.

"The IPAA was founded nearly 15 years ago at a time when huge imports of cheaply-produced foreign oil threatened the existence of the domestic independent industry. Today, it sees in the proposals of government operations in foreign fields a danger no less acute than that which confronted the industry then. The same 'softening up' process of 15 years ago is being used now.

"The policy implied in the creation of Petroleum Reserves Corporation is one that is being formulated by a few persons. No constitutional process has been used in the establishment of a policy of government ownership of foreign oil reserves. There have been individual expressions recently to the effect that the PRC should be dissolved. I favor such action."

OPA Allows Increase In Selected Fields

Upward ceiling price adjustments in crude oil produced in specific fields in Arkansas, Louisiana, and Michigan were announced January 7 by the Office of Price Administration.

The adjustments were authorized, OPA said, because previous ceilings in the fields were out of line with prices of comparable crude oils in the same areas, or because operations at the old levels were being conducted at a loss.

The increases, ranging from 2 to 15 cents a barrel, were granted after petitions requesting a review of ceilings had been filed with OPA.

In Smackover field, Arkansas, the new ceiling is a flat price of 98 cents per barrel, an increase of 15 cents per barrel.

In certain designated fields in Louisiana, the new ceiling price for 40 API gravity and above is $1.30 per barrel, with the customary differentials for lower gravity crudes. This creates the following maximum prices for the following fields: Bayou des Allemands and Raceland fields, for 36.5-gravity, the grade produced in this area, a ceiling price of $1.22 per barrel, or an increase of 13 cents per barrel over the previous ceiling; Gibson field, where oil averages 37 to 37.9-gravity, a ceiling price of $1.24 per barrel, an increase of 5 cents per barrel; Lake Arthur and North Tepetate fields, where oil averages well over 40-gravity, a maximum price of $1.30 per barrel, an increase of 12 cents; Tepetate field, 35.6-gravity, $1.20 per barrel, an increase of 2 cents; Abbeville field, over 40-gravity, $1.30, an increase of 13 cents.

In Headquarters field, Michigan, the new ceiling price is $1.48 per barrel, compared with $1.39 previously, an increase of 9 cents.

The rises, OPA said, will not result in any increase in the cost of living because the purchasers of the crude petroleum have either agreed to absorb the increases or are able to absorb the increases.

Industry Meets Its Responsibilities In Production-For-Victory Program

By R. W. GALLAGHER
President, Standard Oil Company (New Jersey)

FOR the first time, in 1943, the impact of military demand for petroleum products was profoundly felt clear to the roots of the oil industry—from the well to the point of delivery of finished products. This nation which for many years has produced, refined and consumed petroleum products in seemingly limitless quantities was faced with the fact that modern war imposes requirements which exert a severe strain upon the country's facilities, enormous as they are.

During 1942 petroleum shortages were due almost solely to wartime disruption of the oil-transportation system. By now, the transportation problem has been greatly alleviated. During this past year, however, new strains have developed in the producing fields and in the refineries.

To date, the oil industry has kept abreast of the mounting military demands. That must and will continue to be true. At the same time, the minimum essential needs of the home front have to be filled.

The magnitude of military requirements can be illustrated by a simple comparison. During the last year of World War I total military and civilian demand for gasoline was 200,000 barrels a day. Late this year, military requirements alone were 600,000 barrels a day, or approximately one third of the total normal daily production of gasoline in the United States. Requirements for fuel oil and lubricants are correspondingly large.

On top of the routine requirements of the military there are sudden, unanticipated demands. For instance, at one time, because of special requirements, the military services commandeered all of the premium gasoline in a high-consuming area on the East Coast.

In our own case, I recall a radio order from North Africa for 45,000 pounds of a special grease which had never been made in this country. After analyzing the sample supplied to us, we filled the order in less than a week. Immediately we received an order for 260,000 pounds more to be delivered to waiting convoys in 96 hours. The deadline was met, even though the last 22,000 pounds had to be flown to the convoy port by five Army bombers.

The fact that the oil industry is measuring up to its responsibilities in this mechanized war is important. How it is doing it is also important as a manifestation of the ability of an industry to mobilize its many elements and facilities into consolidated, unified action with one objective—production for victory.

This was achieved through the coordination of production and deliveries under the direction of Harold L. Ickes as Petroleum Administrator for War.

With the Petroleum Administration for War as the guiding authority, bold action had to be taken where the strains of military demand were most keenly felt—namely, in the production of crude oil, transportation of crude and refined products, and in refining.

Production of crude oil at the end of the year was nearly 600,000 barrels a day greater than in 1941. Our own organization alone has produced twice as much crude oil since Pearl Harbor as the Nazis have had from every source.

For transportation, thousands of miles of new pipe lines were constructed. The story of these has already been fully told.

In refining, the Number One problem has been to increase the production of 100-octane-aviation gasoline fast enough to meet military demand. An enormous program of 100-octane-plant construction has been proceeding quietly toward completion during 1943. Jersey Standard's affiliates alone have completed eight huge fluid catalytic plants for production of 100-octane. Additional plants will be constructed in 1944, since the demand for 100-octane fuel is reaching figures that would have been regarded as completely unreal two years ago.

The technology of an industry is naturally hard-pressed in wartime. Only wartime engineering, for instance, has brought about the rapid construction of the huge plants now making rubber from petroleum. On the other hand, we see in this case the benefits of peacetime research, for some 80 percent of the synthetic rubber produced in this country will be a type which our technologists brought here and developed before the war.

Our research in oils for use at low temperatures is now bearing full fruit through the use of these oils in the hydraulic controls of combat planes. Petroleum alcohol, insulation materials, rust preventives, and special greases are being produced now in quantities far surpassing the most optimistic estimates of peacetime demands. Much of this has been made possible by the backlog of technical knowledge and research piled up by our scientists and others in the industry during the past decade.

War has brought entirely new problems to the research organizations of the industry. Our scientists, for instance, worked for more than a year perfecting three secret weapons—a large area smoke screen generator, a revolutionary flame thrower and new incendiary bombs. These are already in use.

When peace comes the petroleum industry can rapidly convert its wartime experience and technical advances to the use of the American public.

War Needs May Force 1944 Reduction In Gasoline Available For Civilians

By W. R. BOYD, JR.
President, American Petroleum Institute,
Chairman, Petroleum Industry War Council

THE awful drama of war in which the American fighting man is now playing the leading part, with petroleum in the principal supporting role, now comes into the third act climax for which the whole world is waiting. I say the whole world because I feel certain that our enemies are now as certain of defeat as we, of the United Nations, are confident of the victory which General Eisenhower has promised us in 1944 if we all do our part.

The world now knows that petroleum will continue to do its part and meet all demands made upon it to assure and hasten victory. It knows too, that given the continued opportunity, the American petroleum industry will find the ways and means of keeping the people of the United States adequately supplied with the petroleum products that are no less essential in peace than they are vital in war.

Nineteen hundred and forty-three witnessed the virtual completion of the mobilization of the petroleum industry for war. Just as 1942 was a year of adjustment to the impact of war and of plotting the course to victory, so 1943 was the year in which most plans materialized and preparations became actions. The closing months of 1943 clearly witnessed the "end of the beginning" and just as surely marked the "beginning of the end" for the Axis. The all-out effort of the petroleum industry to keep our fighting forces supplied with all the oil needed not only hastened, but actually made possible the tipping of the scales of war against the enemy.

The coming months will be hard ones for the petroleum industry and for the civilians of this country who must get along on the oil which remains after supplying military needs. The production of crude oil has not received the same encouragement or incentive to expand as has the production of other vital commodities such as aluminum, magnesium, explosives, etc., and the result is that the United States will probably strain its productive capacity in 1944 and still be unable to produce enough oil to supply both our war machine and to reasonably satisfy our civilian requirements.

The facts are simple and should be clearly understood by everyone who cannot get the quantity or quality of gasoline or oil that he would like. A year ago we had only about 1,700,000 men overseas, but by next July that number will have trebled to more than 5,000,000. Trebling our overseas army obviously trebles the requirements for fighting oils. Can our oil production be trebled or even doubled? Not a chance.

In 1941 our crude-oil production amounted to about 1,402,000,000 barrels; in 1942 not quite so much, and in 1943 our straining 405,000 wells produced about 1,500,000,000 barrels, an increase

over 1941 of only a little over 6 percent as compared with the 200 percent increase in our overseas forces. And the Petroleum Administration for War says that at this late date it will be a miracle if the oil fields of the United States can produce throughout the year, at the 4,707,150 barrels a day rate required for January alone.

So after first building a vast new oil-transportation system to replace the one that went to war, and then after building tremendous new refining facilities to turn out nearly one third as much aviation gasoline as our entire peacetime production of all gasoline, we come face to face with the fact that we cannot produce in this country enough crude oil to keep both our military and civilian machines in high gear. The military machine must not slow down, so the civilian must.

This situation means that during 1944 the primary cause of public inconvenience as regards oil will still be the war, but this year the secondary cause will be lack of crude petroleum which cannot be remedied as easily or as promptly or as cheaply as was the lack of transportation facilities in 1942, and the shortage of refining capacity in 1943. New oil fields simply cannot be found by the same procedure that builds pipe lines, tankers and refineries.

Part of the answer will be found by drawing on all possible foreign sources for some of our military requirements as well as for some of our civilian needs.

Another part will be found in the drilling, of more than the 1943 total, of nearly 19,000 wells in known oil fields of this country, and in the search for new fields. But it now appears that most of the answer, particularly on the West Coast, which is already importing oil from Texas, must be found in the reduction of both the quantity and quality of civilian gasoline.

Don't forget that our average fighting man overseas requires his weight in oil every three days to get him there, keep him going and protect him overhead. And remember also that it takes an average of three tons of 100-octane gasoline to deliver and drop one ton of bombs. Think of that when you read of 2000 tons of bombs being dropped on German and Japanese objectives and hope that there will be an ever-increasing tempo of such savage blows until the enemy is crushed and you can once again drive into the gasoline station and say with confidence and certainty "Fill 'er up."

Crude Shortage Could Easily Cause A and B Gasoline Coupons Elimination

By RALPH T. ZOOK

President of Independent Petroleum Association of America

UNFORTUNATELY the citizens of the United States, because the acute stage of the oil shortage will not be reached until some time during the year 1944, do not realize what may take place. They do not know that those who are "holding the line" on the basis of political expedience may be placing the security of the United States in jeopardy.

The oil producer has been shunted from one department to another and one agency to another for more than two years. Each has promised him that the matter of an adequate price for crude oil was being given consideration. It was only after all of these avenues had failed that he took his problem, which is not only his but that of every citizen, to the Congress of the United States. The House of Representatives showed its understanding of the seriousness of the crude-oil supply when it passed the Disney bill by a two to one vote. The Senate when fully informed can be expected to take the same action. Both, however, must be supported by a fully informed public who will in the event of a presidential veto place the responsibility for an inadequate crude oil and in turn gasoline and heating oil supply exactly where it belongs.

The public must know that oil is not found in free flowing streams and lakes; that it can not be produced at will; that now known oil fields will require 50 to 75 years to give up the oil; that there is not 10, 12, or 13 years oil supply at the present rate of production; that the nation can not produce during 1944 at a daily rate beyond the present; that if the war continues the nation faces a shortage of 500,000 barrels daily during the fourth quarter of 1944; that this can easily eliminate all A and B cards and seriously reduce C card allowances; that crude oil prices are but 60 percent of parity; that a 35-cent-per-barrel increase on oil, with compensatory refined products prices, will not be inflationary and are necessary to start the industry on its way to increased oil production.

The alternate to increased domestic production is an increase in imports. This increase must come from wells to be drilled with money and materials from the United States. Even though it is made available, sufficient tankers must be mantained to transport this oil and can not be taken to the West Coast for the big push which must come in the Southwest Pacific. No foreign government can change its mind and reach the conclusion that it is to its advantage to retain its crude oil and not deplete it for another nation; the flow of oil can not be stopped because of submarine or any other action by the enemy and the petroleum requirements of the Allied Nations can not continuously exceed the estimates as they have in the past.

The industry has been told to develop a plan for increased oil production which can be made effective by the application of some subsidy or bonus formula in lieu of a general price increase. Those who have suggested such such plans have never been able to formulate or produce one, even though they have had more than two years to do so. The industry has repeatedly advised of its inability to do so yet "time marches on" and the day of reckoning draws near. Let us keep the record clear—that the oil industry has recommended time and time again what in their opinion is necessary and each time it has been refused and replaced by some crack-pot theory that is absolutely unworkable.

The independent oil producer has many other problems facing him during 1944. He is concerned that increased foreign oil production developed under the demand for petroleum products to carry on the successful conclusion of the war will be used against him at the end of the war to dominate and control the domestic oil industry. He is reliably informed that the price paid for crude oil in some of the Caribbean areas is based on the price of domestic oil and it can readily be to the advantage of the importer to keep the price of domestic oil at its present uneconomic level. He feels that participation by the government of the United States, directly or indirectly, in either domestic or foreign oil fields would be to his decided disadvantage. The possibility of a change in the tax laws that may further hamper his efforts to increase oil production is always before him. He is in need of an adequate allocation of the three "M's", Manpower, Materials, and Money—manpower to man the idle drilling rigs, materials to drill new wells, and money in the form of an adequate price for crude oil.

The year 1944 will present still other problems to the independent producer in addition to those just mentioned and these will be met. There will be no detours.

Pew Advises Return of Competitive Status

In a year end statement J. Howard Pew, president of Sun Oil Company, expressed the opinion that the oil industry is anxious to resume its competitive status, under the restrictions of the anti-trust laws. He paid high tribute to the industry for its solution of aviation gasoline supplies and that of transportion and in regard to competition said:

"Even though rapidly increasing military needs continue to restrict petroleum supplies available for civilian use, the oil industry believes that with the solution of the transportation problem the time has arrived when it should return to the healthy, intelligent competition that made petroleum one of the greatest industries in the world. This can be done when rationing is soundly administered.

"The industry by and large wants no relaxation of the anti-trust laws nor any immunity from either the spirit or intent of this legislation, either now or in the post-war period.

"In order that the petroleum industry may make the great contribution to the better world of tomorrow which its technological developments promise, neither the industry nor the American people should tolerate any combination which might lead to conspiracies against the public interest.

"The competitive spirit burns brightly in the petroleum industry. The light it casts marks the way to better products at lower prices for the consuming public and more jobs and higher wages for those who comprise the industry."

Fuel Oils Taken from Storage Despite Record-Breaking Crude Runs to Stills

Crude runs to stills were stepped up sharply, to a new all-time peak, in the week ended January 1, with the result that production of each of the major products was substantially increased. But the industry still was meeting the heavy current requirements for refined oils only by drawing on too-low stocks of residual fuel and by taking more than a normal seasonal volume of heating oil from storage. Meanwhile, there was not an abnormal accumulation of gasoline in storage, for this time of year, in anticipation of expanded requirements of late spring, summer, and fall.

There has been some strain on sources of crude, as evidenced by the necessity for moderate withdrawals from crude stocks.

The new high to which refinery runs were increased in the week of January 1 was 4,453,000 barrels daily, an increase of 268,000 barrels over the daily average of the previous week, and a noteworthy gain of 737,000 barrels or nearly 20 percent over the runs in the week ended January 2 a year ago, only 3,716,000 barrels per day having been charged to stills in that week.

Crude-oil production meanwhile did not equal the runs to stills, having averaged only 4,357,000 barrels per day in the week of January 1, 1944. The production was off by 6000 barrels daily from the previous week. But it was 486,000 barrels per day or 12½ percent higher than one year previously, when output was but 3,871,000 barrels daily. States of the Southwest and California are furnishing the increased volumes of crude.

In reflection of the unprecedented runs of crude to refinery stills, production of gasoline in the week ended January 1, amounting to 13,192,000 barrels, an average of 1,885,000 daily, was 85,000 barrels a day greater than in the previous week and 370,000 barrels a day or 24½ percent greater than in the corresponding week a year ago.

This large production permitted the addition of 2,278,000 barrels to stocks of finished and unfinished gasoline within the week, a daily average accumulation of 325,000 barrels, as storage expanded to a total of 76,302,000 barrels. However, that quantity was about 4,000,000 barrels or 5 percent less than the 80,472,000 barrels in storage on the corresponding date a year ago.

Production of residual fuel oil, having totaled 9,141,000 barrels within the week, averaged 1,306,000 barrels daily, an increase of 65,000 barrels per day over the previous week, and a gain of 271,000 barrels or 26 percent over the daily average output in the like week a year ago.

In spite of the exceptionally great production of residual, however, current requirements were not fully met, and it was necessary to take from storage 38,000 barrels daily during the week.

Crude Oil Production in the United States

(Estimates compiled by The OIL WEEKLY. All figures indicate daily averages, in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED January 8	January 1
Arkansas	79,600	79,200
California	802,150	801,100
Long Beach	30,300	30,500
Midway-Sunset	55,050	56,050
Kettleman Hills	42,500	42,750
Wilmington	98,200	97,650
Rest of State	576,100	574,150
Colorado	7,350	6,900
Illinois	221,850	*208,300
Salem	29,850	26,400
Louden	33,950	36,300
Other New Pools	146,050	133,950
Old Pools	12,000	11,650
Indiana	11,800	13,250
Kansas	265,900	*265,700
Kentucky	22,600	22,000
Louisiana	359,050	353,550
North Louisiana	78,050	78,050
South Louisiana	281,000	275,500
Michigan	44,200	50,800
Mississippi	46,950	48,000
Missouri	90	90
Montana	24,800	*21,300
Nebraska	1,600	1,750
New Mexico	113,100	113,050
New York	13,900	13,400
Ohio	9,800	9,200
Oklahoma	332,050	325,000
Oklahoma City	58,750	50,200
Seminole Area	72,500	72,000
Rest of State	200,800	202,800
Pennsylvania	39,650	37,400
Tennessee	30	30
Texas	1,900,405	1,894,950
Upper Gulf Coast	520,950	520,550
East Texas Field	366,000	364,500
Rest of Eastern Texas	116,500	126,750
Lower Gulf Coast	194,100	191,250
Southwest Texas	79,650	79,400
South Central Texas	20,000	20,350
West Texas	365,000	354,300
North Texas	140,350	143,350
Panhandle	97,855	94,500
Utah	12	10
West Virginia	9,200	8,700
Wyoming	85,400	86,100
Total United States	4,391,487	*4,359,780

* Revised for week ended January 1.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod. Barrels Daily	Week Ended	Runs to Stills Barrels Daily	Week Ended	Crude Stocks Barrels	Week Ended	Gasoline Stocks Barrels	Week Ended	Gasoil & Distillate Stocks Barrels	Week Ended	Residual Fuel Oil Stocks Barrels	Week Ended
Highs:												
1939	3,910	8- 5	3,650	10-21	278,607	5-26	87,769	4-22	39,562	10-28	116,237	8-26
1940	3,890	3-16	3,690	6-22	265,865	8-31	102,817	4-20	49,051	10-19	109,135	9-14
1941	4,337	11-22	4,120	10-18	266,187	3-29	99,727	3-29	[1]54,983	11-15	102,448	1- 4
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	49,861	11-14	95,857	1- 3
1943	[1]4,436	11-13	4,331	12- 4	245,752	5-29	94,159	3-20	46,187	11-27	72,881	1- 2
1944	4,357	1- 1	[1]4,453	1- 1	.....	....	76,302	1- 1	42,310	1- 1	57,330	1- 1
Lows:												
1939	[2]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 8
1940	3,335	11-30	3,370	1- 6	237,339	1-27	79,847	11- 9	23,551	4- 6	102,344	2-10
1941	3,364	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,381	4-12	90,914	7-12
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-13	232,191	1- 9	68,182	10-16	30,732	4- 3	57,596	12-25
1944	4,357	1- 1	4,453	1- 1	.....	....	76,302	1- 1	42,310	1- 1	57,330	1- 1

TRENDS OF 1942 AND 1943

Trends in Week Ended:	Crude Oil Production Daily	Runs to Stills Daily	Stocks Week End	Gasoline Production Weekly	Gasoline Stocks Week End	Gasoil & Distillate Production Weekly	Gasoil & Distillate Stocks Week End	Residual Fuel Production Weekly	Residual Fuel Stocks Week End
1942:									
January 3	4,038	3,961	244,440	13,797	92,987	3,855	49,357	6,918	95,857
January 31	3,871	3,848	250,740	13,292	97,810	3,817	40,674	6,640	91,189
February 28	4,016	3,675	259,373	12,131	105,635	3,799	34,547	6,813	88,285
March 28	3,820	3,667	263,208	11,663	105,624	3,661	31,756	6,344	83,045
April 25	3,581	3,506	257,073	10,535	102,897	3,267	29,240	6,869	81,107
May 30	3,877	3,522	255,023	10,478	95,355	3,034	31,384	6,993	79,628
June 27	3,719	3,581	253,364	10,713	88,396	3,549	32,851	6,615	77,304
July 25	3,691	3,658	249,262	10,864	82,281	3,647	35,966	6,796	77,816
August 29	3,964	3,697	249,007	11,300	80,831	3,850	42,060	6,875	78,034
September 26	3,909	3,802	242,785	10,954	80,550	4,215	45,954	7,094	78,943
October 31	3,901	3,731	239,266	11,153	79,159	.....	48,131	.....	79,166
November 28	3,878	3,736	234,850	11,269	78,854	.....	49,739	.....	77,798
1943:									
January 2	3,871	3,734	233,938	10,957	82,420	4,285	42,913	7,683	72,881
January 30	3,826	3,698	233,863	10,339	88,830	3,888	37,057	7,452	70,763
February 27	3,873	3,709	235,217	10,566	93,157	4,230	32,939	7,839	70,140
March 27	3,896	3,742	239,126	10,231	94,079	3,541	30,980	8,018	67,938
April 24	3,913	3,737	242,035	10,583	91,001	3,954	31,142	8,168	67,455
May 29	3,970	4,679	245,752	10,656	83,937	3,798	32,274	7,672	67,682
June 26	3,955	4,015	242,657	11,092	79,589	3,876	34,044	8,126	67,960
July 31	4,133	3,788	238,420	11,127	74,977	3,765	36,363	8,478	66,877
August 28	4,196	4,227	236,170	12,420	72,525	4,351	37,928	8,732	67,250
September 25	3,344	4,156	233,013	12,206	70,024	4,608	40,328	8,560	66,659
October 30	4,383	4,176	237,219	12,813	69,297	4,642	44,591	7,968	63,838
November 27	4,414	4,261	239,761	12,638	69,980	4,379	46,187	8,633	62,143
December 25	4,363	4,185	241,310	12,597	74,024	4,457	43,791	8,689	57,596
January 1, 1944	4,357	[1]4,453	.....	13,192	76,302	4,575	42,310	9,141	57,330
[5]January 2, 1943	3,871	3,716	[4]233,227	10,599	80,472	4,079	44,833	7,240	72,672
Change:									
In week	—6	+268	—485	+595	+2,278	+118	—1,481	+452	—266
In year	+486	+737	+8,083	+2,593	—4,170	+496	—2,523	+1,901	—15,342
In year	+12.5%	+19.8%	+3.5%	+24.5%	—5.2%	+12.2%	—5.6%	+26.3%	—21.0%

[1] All time peak. [2] Lowest since April, 1922. [3] Lowest since October, 1922, due to shutdown of six Mid-Continent states [4] Stocks, December 26, 1942. [5] Bureau of Mines Basis.

Having been lowered to 57,330,000 barrels, the stocks were over 15,000,000 barrels or 21 percent under the level a year previously.

Gasoil and distillate fuel production totaled 4,575,000 barrels in the week of January 1, an average of 653,000 daily. That was 19,000 barrels a day more than production in the previous week and 71,000 barrels a day or 12 percent more than in the corresponding week a year ago.

Despite the comparatively large production of gasoil and distillate fuel, it was necessary to draw on stocks by the large daily average of 212,000 barrels, leaving on hand only 42,310,000 barrels, which was about 2,500,000 barrels or 5½ percent less than the 44,833,000 barrels in storage January 2 a year ago.

West Texas-New Mexico Crude Prices Adjusted

Revised crude price schedules for West Texas and New Mexico were issued by The Texas Company and Magnolia Petroleum Company, both effective January 1, having the effect of increases of 2 to 8 cents a barrel for lightest crudes involved and decreases of 2 to 8 cents for heaviest crudes, by extending the gravity scale both upward and downward from previous ranges. However, the same new prices already were being paid by Humble Oil & Refining Company and some other purchasers.

The prices thus more generally posted now begin at the bottom with 70 cents a barrel for all crudes below 20 gravity, 72 cents for 20-20.9-gravity, and grade on upward, by differential of 2 cents for each degree of gravity to a top price of $1.12 for crudes of 40-gravity and above, based on use of 100 percent tank tables.

Previously, The Texas Company's bottom posting was 78 cents a barrel for crudes below 24-gravity, and its top posting was $1.04 for 36-gravity and above; while Magnolia also formerly did not grade the heavier crudes down as far as now.

Both companies post in Lea County, New Mexico, and in Cochran, Crane, Hockley, and Winkler Counties, West Texas; and in addition, Magnolia posts in Upton, Howard, Glasscock, Mitchell, Yoakum, Gaines, Pecos, and Andrews counties.

Nation's Oil Production Up for First Week 1944

Taking an upward swing the week ended January 8, crude oil production in the United States reached a total of 4,391,487 barrels, and thus culminates in an increase of 31,707 barrels as compared with the total last week of 4,359,780 barrels.

Significant increases were reported from Texas, 5455 barrels, Illinois, 13,550 barrels, Louisiana, 5500 barrels, Oklahoma, 7050 barrels, Montana, 3500 barrels, California, 1050 barrels, and the Eastern States.

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PIPE LINE REVIEW

Not Enough Tank Cars For West Texas Schedule

Tank-car movement of West Texas oil to East Coast refineries remains below the 40,000 barrels daily quota fixed by PAW as the requirements of the three plants. Ample crude has been available since shipments were started from Atlantic Pipe Line Company's rack near Midland on November 19, but tank cars have not been provided to meet the schedule. Shipments averaged 17,000 barrels daily during the last 12 days in November, and 23,777 barrels daily for December, then dropped to an average of 16,755 barrels daily during the first five days in January. Deliveries are made to Colonial Beacon Oil Company's Everett, Massachusetts, plant and the nearby refinery of the Cities Service Oil Company, while that consigned to The Atlantic Refining Company's Philadelphia unit is relayed by pipe line from Pittsburgh.

Oklahoma Pipe Line Buys Pickens System

Oklahoma Pipe Line Company has expanded its operations in Mississippi through the purchase of the Allied Pipe Line Corporation's gathering system in the Pickens field of Madison and Yazoo counties. The purchase includes 13 miles of line, storage facility and a 20-car loading rack situated on the Illinois Central Railroad near the town of Pickens.

The Pickens field is now running about 5000 barrels per day, The Carter Oil Company being the principal producer.

Oklahoma Pipe Line Company will establish a district office in Jackson, Mississippi, in charge of Dallas Luttes, formerly division engineer at Wewoka, Oklahoma.

First Pipe Rolled for West Virginia Gas Line

The first pipe was rolled on December 23 for the Tennessee Gas and Transmission Company's 24-inch gas line from the Corpus Christi area to West Virginia. Construction is being started in Louisiana, Mississippi and Tennessee.

Numerous river crossings are now being worked on. They include the Guadalupe and Trinity in Texas, Ouachita in Louisiana, and the Tennessee, Cumberland and Kentucky in Tennessee and Kentucky.

Work has started on compressor station No. 10 at Lobelville, Tennessee. Construction will start on other stations within the next two weeks.

Little Likelihood for Texas-California Pipeline

Any hopes that a pipeline to carry Texas and New Mexico crude to California may be given favorable consideration were dashed by a statement given out in Los Angeles last week by Deputy Administrator Ralph Davies of the PAW.

The reason Davies considers there is little possibility of such a pipeline is that by next spring West Texas and New Mexico will have no excess productive capacity with which to feed it. New transportation facilities to be available by then would absorb all the 200,000 barrels of excess which now might be available, he said.

District 2 Refiners Denounce Oil Rate Action

Representatives of 26 refining companies in PAW District 2, meeting in Chicago on December 28, denounced the action taken by the Defense Supplies Corporation in "equalizing" rail and pipe-line rates for crude oil shipments from West Texas to Middle West plants.

The gathering branded as unfair and hurtful to the war effort the DFC ruling that the compensation plan would apply only in the cases of refiners who are not in the excess profits brackets. Immediate remedial action was demanded, in order to make use of idle refinery capacities, which total some 200,000 barrels daily within District 2.

The Chicago meeting was called by W. W. Vandeveer, PAW director for District 2, indicating that PAW is opposed to the DFC plan. At the meeting, plans were made for a determined move toward a more equitable arrangement, so that all District 2 refiners can share alike in securing West Texas crude oil on a discount rate basis.

Tide Water Buys East Texas Production

Midstates Oil Corporation, Tulsa, has disposed of its holdings in the East Texas field, involving 6 leases with 58 flowing and pumping wells on 224 acres, to Tide Water Associated Oil Company for $2,500,000 cash. All the leases received their initial development in 1931 by Turman Oil Company, predecessor of Midstates Oil Corporation.

Completions of 1943 Only Two Thirds Normal, But Drilling Now Accelerated

Drilling for oil and gas continued at a comparatively high level in December, in spite of a slight decline from November, which probably was due in part to winter weather; and maintenance of active development in January was foreshadowed by the relatively large number of rigs in operation at the beginning of the month.

In reflection of the gradual stepping up of field work as the year progressed, and the wartime maintenance of a normal amount of wildcatting, the industry did approximately two thirds of a normal year's total drilling in 1943, although the year's total completions fell 10.9 percent short of the subnormal total of 1942.

Subject to minor revisions, the total of all wells completed in 1943 was 19,101, compared with 21,454 in 1942 and the near-all-time record of 32,210 of 1941, established just before the United States went to war. (Highest total on record is that of 33,945 for 1937.)

Incidentally, the number of wells actually completed in 1943 almost exactly fulfilled the forecast of THE OIL WEEKLY in the Yearbook-Forecast number, published February 1, 1943. (The forecast was for 18,574 new wells, old wells deepened not having been taken into consideration, and the actual number of new wells drilled was 18,673.)

The total of 1701 United States completions recorded for four weeks of December, 1943, represented an average of 425 per week, compared with averages of 434 for November (revised), 386 in October, and 378 in September. The last two months of 1943 both brought more active drilling than any month of 1942, in spite of the fact that 1943 as a whole showed a decrease. (Highest average for 1942 was that of 423 per week in September.)

That January will bring a continued relatively high rate of completions is indicated by the fact that 3148 wells were drilling or rigging up on January 1, compared with 3261 on December 1. Corresponding total for November 1 was 3168, for October 1 it was 2968, and for the beginning of September 2868. On January 1 a year ago there were only 2260 rigs in operation, to compare with the 3148 at the beginning of this year.

The 19,101 total completions of the year 1943 included, in addition to the 18,673 new wells, 428 old wells drilled deeper. The new wells included 9528 that produced oil or distillate, 1534 gas wells, 1708 injection and water-disposal wells, and 5903 dry holes, the latter having represented 32 percent of all new wells completed.

Most noteworthy decreases in drilling in 1943 occurred in Louisiana, down 39 percent from 1942, New Mexico down 29 percent, Ohio 35 percent, Pennsylvania 34 percent, West Texas 30 percent, Texas Panhandle 45 percent, the Upper Texas Gulf Coast 24 percent, South Central Texas 39 percent.

Prominent among the states registering increased drilling in 1943 was California where completions were up 79 percent, while there were increases of 66 percent in Arizona, 13 percent in Arkansas, 130 percent in Colorado, 400 percent in Florida, 100 percent in Georgia, 8 percent in Kansas, 154 percent in Kentucky, 25 percent in Montana, 39 percent in Nebraska, 1 percent in New York, 8/10 of 1 percent in Oklahoma, 22 percent in North Texas, ¼ of 1 percent in West Central Texas, and 28 percent in Wyoming.

Wells Completed in United States During 1943 and Number Now Drilling

(Figures compiled from weekly reports of editorial staff men, with following exceptions: Arkansas data from Arkansas Oil & Gas Commission; California from A.P.I. except for December; Illinois from Illinois Geological Survey except for December; Indiana from Indiana Division of Geology; Missouri from Missouri Geological Survey; Allegany, New York, Bradford and Kane-Clarendon, Pennsylvania, from The Producer's Monthly; Tennessee from Tennessee Division of Geology.)

	MONTHLY COMPLETIONS: December, 1943									CUMULATIVE COMPLETIONS: Year 1943								RIGS IN OPERATION					
	Details for Dec., 1943					Total Completions				Details Jan.-Dec., 1943					Total Completions				Details for January 1, 1944			Total: Drilling and R.U.		
	New Wells				Old Wells Deepened					New Wells				Old Wells Deepened										
State or District	*Oil	Gas	Dry	Others[6]		Dec., 1943[1]	Nov., 1943[3]	Dec., 1942[2]	Total Footage Dec., 1943	*Oil	Gas	Dry	Others[6]		Jan.-Dec., 1943[4]	Jan.-Dec., 1942[5]	Percent Change	Total Footage 1943	Drilling	Rigs Up	Shut Down	Jan. 1 1944	Dec. 1 1943	Jan. 1 1943
Alabama												2			2	3	— 33.3	11,127	4			4	1	
Arizona							1	1	3,464			5			5	3	+ 66.6	14,498	3		3	3	1	
Arkansas	16		5			21	19	21	87,897	158	1	97	2	1	259	230	+ 12.6	1,213,047	32	3	1	35	44	22
California	107	3	21			131	159	95	431,644	1,153	29	262		33	1,477	826	+ 78.8	4,609,932	281	59	19	340	356	165
Colorado	2		8			10	2	1	28,460	12	2	20			34	15	+126.6	92,181	12	1	7	13	10	6
Florida							1			1		4			5	1	+400.0	22,833	1	2	1	3	5	2
Georgia							2					4			4	2	+100.0	13,660	1			1		1
Illinois	99		57			156	149	184	416,364	1,030	11	710	22	39	1,812	2,144	— 15.5	4,515,871	148	30	33	178	211	215
Indiana	17	7	16			40	40	44	70,588	112	21	167		5	305	395	— 22.8	552,738	32	7	9	39	41	48
Iowa												3			3			4,874			2		1	1
Kansas	72	7	60	1	10	150	163	128	465,212	868	34	792	20	34	1,748	1,618	+ 8.0	5,772,016	214	11	32	255	266	164
Kentucky	16		23			39	47	13	59,332	198	5	219	3	2	427	168	+154.2	796,611	63	7	4	70	68	54
Louisiana	24		9			33	43	52	271,804	315	35	205			555	913	— 39.2	4,060,943	97	12	20	109	103	97
North	3		2			5	10	25	32,594	92	26	89			207	428	— 51.6	937,380	32	7	13	39	33	29
South	21		7			28	33	27	239,210	223	9	116			348	485	— 28.2	3,123,563	65	5	7	70	70	68
Michigan	25	3	31			59	51	33	160,448	223	50	322		9	604	666	— 9.3	1,549,702	77	19	24	96	104	60
Mississippi							6	4		34		53			87	101	— 13.9	474,217	13	3	5	16	14	13
Missouri		1	1			2	5		2,535	2	6	21			29	34	— 14.7	24,304	6			6	5	3
Montana	20	6	8			34	30	7	78,151	142	42	58			242	193	+ 25.4	531,846	50	17	16	67	75	30
Nebraska			2			2	1		6,695	6		33			39	28	+ 39.3	98,504	5		3	5	4	14
New Mexico	18		7		1	26	18	28	69,655	179	6	73		13	271	384	— 29.4	800,170	84	7	20	91	79	43
New York	59	3	4	33		99	104	91	151,366	781	7	11	442		1,241	1,228	+ 1.1	1,713,195	81	15	20	96	106	89
North Dakota																			1			1		
Ohio	17	4	9			30	26	98	86,815	152	316	256	1	12	737	1,134	— 35.0	1,864,545	158	22	39	186	196	202
Oklahoma	61	10	35	6	12	124	147	164	385,477	571	105	616	66	108	1,466	1,454	+ .83	4,515,118	327	55	4	382	387	213
Oregon																								1
Pennsylvania	89	19	1	77		186	243	218	323,355	1,122	232	61	1,104	11	2,530	3,845	— 34.2	4,352,533	180	27	43	207	255	226
South Dakota																			2		1	2	1	2
Tennessee								1			2	4			6	9	— 33.3	6,134	3	2	1	5	2	2
Texas	245	17	171	2	22	457	412	291	1,926,522	2,288	130	1,761	48	143	4,370	5,198	— 15.9	18,176,176	787	46	122	833	799	512
E. Tex. Border							2			13		5			18	2	+800.0	114,294	7	1	1	8	9	9
E. Tex. Field													5		5	17	+ 70.6	11,950						
Rest of E. Tex.	11	1	14	1		27	32	12	161,420	126	3	123	2	1	255	397	— 35.8	1,400,509	48	7	13	55	51	19
North	66	1	55	1	5	128	109	58	321,198	475	2	554	39	38	1,108	910	+ 21.8	2,945,070	116	5	27	121	126	84
West Central	8	4	23		5	40	37	58	100,035	112	20	236	1	25	394	393	+ .25	891,548	54	1	11	55	52	48
West	74		13		12	99	98	50	426,586	739	7	157		68	971	1,380	— 29.6	4,067,030	320	10	26	330	289	169
Panhandle	17	2	3			22	17	20	69,050	137	30	28		7	202	367	— 44.9	604,996	35	8	13	43	48	45
Upper Coast	15	1	19			35	35	33	269,572	165	7	164		1	337	444	— 24.1	2,564,387	79	6	9	85	82	43
Lower Coast	39	4	19			62	49	37	385,417	365	43	230	1	2	641	777	— 17.5	3,847,037	90	6	13	96	95	60
Southwest	14	4	17			35	27	13	160,134	146	18	207		1	372	401	— 7.2	1,525,191	31	1	5	32	36	23
S. Central	1		8			9	6	10	33,110	10		57			67	110	— 39.1	204,164	7	1	4	8	11	12
Utah																			3		1	3	2	2
West Virginia	11	64	12			87	61	69	222,407	81	495	123		18	717	764	— 6.2	1,951,028	49	7	12	56	60	43
Wyoming	11	2	2			15	8	3	68,916	100	5	21			126	98	+ 28.6	535,736	46	6	5	52	65	30
Total U.S.	909	146	482	119	45	1,701	1,738	1,546	5,317,107	9,528	1,534	5,903	1,708	428	19,101	21,454	— 10.9	58,273,539	2,760	388	447	3,148	3,261	2,260

* Includes distillate wells. [1] Wells completed in 4 weeks, or 28 days, ended December 25, 1943. [2] Wells completed in 4 weeks, or 28 days, ended December 26, 1942. [3] Wells completed in 4 weeks, or 28 days, ended November 27, 1943. [4] Wells completed in 52 weeks, or 364 days, ended December 25, 1943. [5] Wells completed in 52 weeks, or 364 days, ended December 26, 1942. [6] Water input, gas injection, and salt water disposal wells.

Turner Valley Pipe Line Rate Controversy Brings Up Reserve Question

After weeks of bickering over existing and proposed pipe-line rates for the 25-mile haul from the Turner Valley field to Calgary refineries, the public utilities board of Alberta inaugurated a probe of the controversy early in November.

The argument hinges around a "fair estimate" of the oil reserve of the Turner Valley field, as a basis for fixing immediate and future rates of the Valley Pipeline Company. The company hopes to win a ruling allowing it to raise its charges to more than the 9½ cents per barrel currently being charged, or at least to stave off any further reduction in the rate.

Before July 3, 1939, the pipe-line company was allowed to charge 15 cents per barrel, but on that date the utilities commission reduced the charge to 9½ cents, and now seeks to impose a further reduction to approximately 7¼ cents.

The 9½-cent rate was established upon the recommendations of a report of 1939, wherein the field's potential was estimated at 4,000,000 barrels annually. Since that time the pipe line's throughput has been running approximately 6,000,000 barrels per year. Since the 9½-cent rate was computed on the basis of an annual 9½ percent return on the investment, at 4,000,000 barrels, the provincial government cites justification for reducing the rates further.

On the other hand, pipe-line witnesses hold that the field has passed its peak of production, and that a rate cut would mean a net loss in the operation of the line as a result of decreased throughput in the future. To back up this contention, experts have taken the stand in behalf of the company to brand as too optimistic the estimates of government and producer experts as to the size of the Turner Valley reserves.

Byron B. Boatright, of Houston, who served on the McGillivray commission in 1938-39, has again been retained as a government expert to study the current situation. He testified, late in December, that the field's recoverable reserves total 126.4 million barrels, including 120.5 million barrels of crude oil and 4.8 million barrels of natural gasoline. He estimated the original reserves of the field at 189 million barrels, of which amount something like 63 million barrels had been produced up to October 1, 1943.

This estimate is in sharp contrast with that of Vernon Taylor, Royalite Oil Company engineer, whose testimony dealt only with remaining reserves for the 8-year period from 1943 to 1950, inclusive. He estimates production for this period, from present and future wells, at 39.8 million barrels. During the first nine months of 1943 the actual yield from Turner Valley wells was 7,166,680 barrels, including 331,819 barrels of natural gasoline, 6,795,112 barrels of limestone crude, 36,112 barrels of limestone naphtha, and 3637 barrels of shallow crude from sandstone wells. Deducting these amounts, Taylor's estimate would allow for the production of only 32.7 million barrels during the remaining 87 months of his 8-year period.

Taylor estimates that approximately 288 wells will be the limit of productive locations within the boundaries of the field. This would allow for only 70 new wells. On the other hand, Boatright has stated that as many as 440 new wells can be drilled within the present known limits of the field.

Both pipe-line company and government witnesses have had access to all the accumulated data on Turner Valley well performances, but find the information susceptible to varying interpretations, as did the experts who testified as witnesses during the hearing conducted by the McGillivray commission several years ago. Witnesses in the present hearings have made several references to the 1938-39 testimony, particularly the estimate made by Boatright at that time that Turner Valley reserves would prove to be somewhere between 171 and 256 millions of barrels, based on an average per-acre production of 17,000 barrels.

At the McGillivray commission hearings, Royalite company's witness, Alexander Duessen of Houston, estimated the reserve at 122.4 million barrels. Theodore A. Link, now special Dominion Commissioner in charge of oilfield development in northwest Canada, estimated the reserve at 107.9 million barrels; and Royalite's A. J. Davies placed the figure at 113 million barrels. Dr. Link, as geologist for Imperial Oil, Ltd., conducted the first explorations in the Turner Valley area, and selected the location for the discovery well of the field, drilled in the late twenties.

J. J. Frawley, government counsel for the Province of Alberta, commenced his argument calling for a reduction in the pipe-line charges on December 27; and final arguments are expected to be completed before January 15. The ultimate decision of the public utilities board of Alberta will probably be announced before the end of January, at which time the official reserve figure for the field will very likely be revealed.

In the meantime, Turner Valley producers are concerned not only with the pipe-line rates, but with the question as to more rigorous conservation control of natural gas produced. The provincial petroleum and natural gas conservation board is planning to put into effect regulations requiring either that the gas be sold or forced back into producing or storage formations in the gas cap area, through old wells in township 19; with the Bow Island gas field sands also being considered as storage reservoirs.

Superior Oil Company Forms Canadian Subsidiary

Superior Oil Company of California has secured a Dominion charter for its newly-formed subsidiary, Rio Bravo Oil Company, registered in Alberta. Initial operations of the new company will be localized in a 19,800-acre block, secured as a Crown reservation, extending south from a line approximately 13 miles south of the S. Turner Valley field.

The reservation was previously held by Chain Lake Syndicate, which transferred its interest for substantial cash, plus further payment if production is found. No private royalty interests are involved.

The Rio Bravo block is surrounded by Gulf Oil Company's 321,000-acre southern foothills leaseholdings. Superior Oil Company geologists have been working in the area since last June. J. S. Irwin prepared the original geological report for Chain Lake.

Oil Reserves Being Outlined in Colombia

Much of the petroleum exploration in Colombia is being pursued not so much to boost current production as to outline reserves for post-war needs. This is particularly true in the Cartagena district, where a number of foreign subsidiaries are carrying on an extensive campaign of leasing, geological and geophysical exploration and wildcatting. An excellent well has been brought in near Simiti, proving potentialities of the area, and operators are confident that large new reserves will soon be established along the Magdalena River.

Ecuador Increases Crude Oil Production

Output of crude oil from fields in Ecuador reached 63,481 barrels for the third quarter of 1943, a 21-percent increase over the previous quarter, and 22 percent above the figure for the corresponding period in 1942. Total output for 1943 is estimated at approximately 231,000 barrels.

In spite of increasing production that country's exports are falling off, as more oil is being used for nearby needs. Uruguay is the largest purchaser of Ecuadorean oil, followed by Brazil and Argentina, in that order.

American Firm Drills Nicaraguan Wildcat

An unidentified American oil company is reported to be putting down a wildcat well at a location 40 kilometers north of Puerto Cabezas, Nicaragua. More than 3500 feet of hole had been made in the test at the end of October, according to reliable information released by the U. S. Department of Commerce foreign trade division.

No. 28 Completed by Cannar in Vermilion

The drilling in of three wells late in December brought to 28 the number of producing wells owned by Cannar Oils, Ltd., in the Vermilion field, Alberta. The Cannar concern is a subsidiary of Canadian National Railways, which has entered the oil-producing business to assure adequate supplies of fuel oil for locomotives.

U. S. Field Operations

Illinois

Two Interesting Wildcats Reported in Jefferson

Jefferson County provided the most interesting news in a drab week in Illinois where operations continued to dwindle.

The Texas Company's Green 1, E½ SE SE 15-1s-3e, is a wildcat near the village of Divide and removed from production in the Divide field, and is 6 miles due east of the south end of the Salem pool. Another interesting wildcat was Kewanee Oil Company's Webb 1, NE NW SW 4-3s-3e, near Mt. Vernon and 2 miles from production.

In the Divide field, Gulf Refining Company's Shaeffer 1, E½ NW SE 13-1s-3e, swabbed 80 barrels of oil and five barrels of water in 11 hours from McClosky lime after a 1000-gallon acid treatment. Production was better than anticipated.

Fayette County: The Texas Company's Stokes 1, SW NW NW 7-8n-1e, a rank wildcat in Ramsey township, is drilling below 3400 feet and headed for the Trenton lime after finding the Devonian dry.

Clinton County: C. H. Nickerson and associates' Goffray 1, NE NE SE 2-1n-3w, was scheduled for abandonment as a dry hole at a depth of 1508 feet in the Fredonia lime. A slight show of oil was found in Cypress sand at 1220-25 feet. Government surveys show this location as the highest point in the county.

Jasper County: Continental Oil Company has spudded Blair 1, SE NE NE 9-5n-9e, a wildcat 2 miles southeast of Bogota and about 3 miles west of Dundas Consolidated field.

Franklin County: Sohio Producing Company and Nash Redwine are rigging rotary tools to deepen Taylor 2, NW SW NW 21-5s-3e, a northwest offset to the discovery. The Taylor 2 was temporarily abandoned at 2853 feet.

Indiana

Best Recent Discovery Is In South New Harmony

Sells Petroleum Company and others appeared last week to have the best discovery in Indiana in many months, if not in the recent history of the state's oil development.

The well, Wade 1, SE SW NE 14-5s-14w, swabbed 250 barrels of oil and no water in 10 hours from Hardinsburg sand topped at 2454 feet. On a one-hour drill stem test at 2455-69 feet, the well made gas in 20 minutes, 1340 feet of oil and 60 feet of oil-cut mud. The well is located 1½ miles southeast of the New Harmony pool and tentatively has been named the South New Harmony pool.

Bennett Brothers' Spencer 1, NE SE SW 32-6s-14w, has proved disappointing. Located three and a half miles west of the Mt. Vernon pool, the well upon pump completion, initially made 45 barrels of oil and the same amount of water in 25 hours from Tar Springs sand. In early tests, the well had an excellent appearing yield by flow through casing.

L. L. Benoist has completed Richards 1, SE NE SE 11-7s-7w, as a discovery with small production. On initial pump test of McClosky lime at 1540-46 feet, the well made 4 barrels in 24 hours.

Operations moved down from 68 to 67 during the first week of the year and included, 35 wells drilling, 19 locations, 7 wells rigging tools and 6 inactive tests. First reports total 3. Twenty-seven wildcats were recorded with 14 drilling, 5 locations, 5 rigging tools and 3 inactive tests. No oil wells were completed nor were any dry holes or abandoned locations recorded.

Kentucky

Pool Opener and Extension Both in Union County

Union County was the center of attention in Western Kentucky last week with a pool opener completed and an extension well showing for production.

The completion was Paul Luring's Spaulding 1, 4-O-20, located 1½ miles east of the Wathen pool. It pumped on initial test 47 barrels of oil and 47 barrels of water from McClosky lime at 2646-52 feet after 2000 gallons of acid. The well tentatively has been named discovery of the Chapman pool. Total depth was 2739 feet.

The promised extension is Miller and Schiarella's Moore 1, 16-P-21, ½ mile northwest of the Utley pool also in Union County. Pipe was set for test with cable tools after the well made gas in five minutes and flowed oil in 70 minutes during an 80-minute drill stem test at 2564-76 feet in McClosky lime.

Operations in the state last week totaled 83, the same as the ending week in December. Sixty-four wells were drilling, 11 were locations, 4 were rigging tools and 4 were inactive. First reports totaled 4 of which 1 was a wildcat.

Wildcats totaled 28, of which 22 were drilling, 3 were locations, one was inactive and 2 were rigging tools. Two oil wells were completed with total initial production of 191 barrels. Two holes were dry.

Kansas

Saturation in Trego County Wildcat; Work Is Slow

Arbuckle lime is returning good saturation at a wildcat location 2 miles northwest of Ellis field where Huber, Barnett and Aylward's Cotton 1, CW½ NE NE 26-12s-21w, is coring ahead in the formation. The well topped Topeka lime at 3270 and found saturation sufficient to make a test desirable if no deeper strata indicated possibilities of more production. A core from 3299 to 3303 feet was saturated, and there was slight saturation from 3355 to 3364 feet in another core. Lansing lime was drilled at 3522 feet and spotted saturation was noted from 3570 to 3573. Arbuckle lime was topped at 3908 feet and cored to 3914 feet from which depth an additional 13 feet showed good saturation. At 3927 feet the well was coring ahead.

Rice County: Phillips Petroleum Company's Click 1, SE SE NE 3-18-7w, which looked like the opener of a Misener field of probable limited area, has completed for 112 barrels of oil on the pump. The discovery however, produced about 70 barrels of water along with the crude. Misener sand was drilled from 3182 to 3187 feet.

Saline County: Deep Rock Oil Corporation's Van Meter 2, a field well in the new Hunter pool, completed for 189 barrels of oil and no water natural from Mississippi lime at 2627 to 2632 feet. In the same county, Pryor & Lockhart's Duncan 1, wildcat test in SEc 35-13-1w, which cored saturation in Mississippi lime and ran casing to test, is still testing and incomplete.

Oklahoma

Important Wells Are in Pay; Others Test to Complete

Currently the most important test in Oklahoma, Carter Oil Company's Cottingham 1, CSE SW 4-7n-3w, McClain County, cored into second Wilcox sand (Ordovician) to find fair porosity and staining. The test is located upon a deep-seated seismograph high in an area immediately west of the Nemaha Ridge zone of fracture, and is only one of a number of aniclinal features that will be tested on the basis of findings in the Cottingham. A prior well by Mid-Continent Petroleum Corporation on a similar although fault-bound structure has already given the area one field in the deeper structures, and Carter Oil Company has a second well drilling another feature in the area also analyzed by seismic methods.

Cottingham 1 had Simpson dolomite at 10,365 feet, and cored from 10,630 to 10,636 feet. The upper four feet of the core was sandy dolomite with some oil odor and a light oil staining. The lower section of the core was well stained and showed good porosity with the texture of the stratum indicating a gradation from dolomite into sand. Second Wilcox was picked at 10,633 feet, the first bench of the formation having been absent. Earlier, the well had Viola lime at 10,227 feet.

A second core to 10,641 feet showed additional coarse sand with good porosity and well stained throughout. There was a slight tightening of the last six inches of the sand obtained in this core. While the showings to date do not necessarily indicate production, operators of the state are highly optimistic. As the week closed, Carter Oil Company was reaming down to total depth before taking additional cores.

Noble County: Gulf Oil Corporation's Juanita 1, NEc 1-21-1e, a recent discovery in Wilcox sand at 4590 to 4597½ feet, which shut in due to lack of outlet and facilities for complete testing, is now connected and testing with early completion in prospect. The well originally flowed at a rate of 25 barrels hourly.

Oklahoma County: West Edmond field, where Hunton lime and Bartlesville sands are being developed is getting

a new producer as Sohio Producing Company's Harper 2, CSW NE 31-14-4w, is preparing to test between a casing spot at 7066 feet and total depth of 7231 feet. There are five operations in the field, work being slowed down due to bad weather.

McClain County: The second well being drilled as a test of anticlinical features in this area, Carter Oil Company's Johnson Ranch 1, CSW NE 13-8n-4w, drilled into Woodford sand at 9364 feet and at 9500 feet went into Hunton lime. A core from 9511 to 9521 feet provided a 1-foot recovery showing good porosity and a good odor of oil. This test, the second favorable wildcat testing shows, was coring over the weekend.

West Texas

Wheeler-Ellenburger Pool Has Show in Devonian Lime

Oil production from the Devonian lime appears to be a likely pay strike for the Wheeler-Ellenburger pool, eastern Winkler County, through Stanolind Oil & Gas Company and Shell Oil Company's Blue 2, a half mile south of their 10,697-foot discovery, having recovered 1365 feet of gas-cut mud, 820 feet of oil and 200 feet of oil-cut mud on a 45-minute drill-stem test at 8292-8413 feet. The gas volume was negligible. This south outpost entered Devonian chert at 8347 feet with elevation of 3082 feet, and is 73 feet low. The partnership's Wheeler-Sun 1-A, a half mile west of the discovery, entered Devonian chert at 8410 feet, or 133 feet low, and proved dry on drill-stem test at 8499 feet. Structural position became less favorable in topping Silurian at 9090 feet, or 348 feet low, and test was drilling at 9330 feet, about midway through the Silurian beds.

Keystone-Ellenburger: Sid Richardson et al's Walton 10-E, south offset to the discovery, was drilling at 7743 feet, having entered the Montoya at 7684 feet, or 93 feet high. Sinclair Prairie Oil Company's Walton 4-A, three-fourths of a mile northwest of the deep strike, is also registering a higher structural position than the discovery, although a sharp drop was generally expected to the west. This test was drilling at 8430 feet in Simpson, topped at 8120 feet, or 79 feet high.

Dawson County: Seaboard Oil Company's Spraberry 1, prospective oil strike from Lower Clear Fork series, failed to exclude bottom-hole water in plugging back from 7679 to 6876 feet, although swabbing test indicated sufficient 37-gravity oil with the water to indicate a pumper. Hole will be plugged back to 6740 feet. Top of oil pay was called at 6630 feet. Gulf Oil Corporation's Dean 1, near the east edge of the county, was drilling unidentified formation at 10,360 feet.

Pecos County: Globe Oil & Refining Company and Forest Development Corporation's Colden 1 abandoned after testing water in Ellenburger at 6190-6236 feet, and Siemoneit Drilling Company and E. M. Wahlenmaier's Crockett-Shell 1 also yielded water in Ellenburger at 4700-4812 feet before plugging. Humble Oil & Refining Company's Barnes 1, situated along the same general trend was coring dry dolomite at 4420 feet, possibly in Ellenburger. Phillips Petroleum Company's Price 1, record depth test for the basin, was drilling hard chert and lime at 12,925 feet.

Andrews County: The Texas Company's Mabee 4, mile southeast of its Mabee pool discovery pumper, landed 7-inch at 4638 feet after pulling a 10-foot core at 4650 feet that showed oil and gas with a few streaks of lime bleeding water. Maximum oil saturation was near bottom of core. The 3 previously drilled tests now awaiting pipe-line connection for official pumping gauge also showed water above the main oil zone. The company's Mabee 5 was drilling at 4165 feet, and derrick was up for Mabee 6. All wells are spotted to prove up the maximum amount of acreage, and continuous development will be given the proved locations. Ralph Lowe et al's Lowe 1, 3⅛ miles northeast of nearest production in Fullerton field, landed 5½-inch at 7053 feet to test at 7309 feet after logging nominal oil stain, topped at 7060 feet with elevation of 3325 feet. C. U. Bay et al's Bitler-Lowe 1, 1½ miles northeast of Fullerton field and nearest well to the above wildcat, is awaiting official gauge after flowing 45 barrels of oil hourly following 7-stage treatment of broken Clear Fork pay at 6880-7381 feet with 36,000 gallons of acid. This outpost topped the San Angelo at 5750 feet and Glorietta at 5770 feet with elevation of 3319 feet.

Cochran County: Seaboard Oil Company and Texas Pacific Coal & Oil Company's Evans 1, 4 miles southwest of Bledsoe, swabbed dry after plugging back from water at 5134 feet to 4935 feet, and will acidize.

Development: Gulf Oil Corporation has taken the lead among the operators having a substantial backlog of proved undrilled locations in reviving drilling to pre-war basis. The company finished the year with 8 drilling tests and 4 derricks and rigs. Permits have been obtained since the holidays for more than a score of additional tests within or adjacent to production, including 10 for its Waddell et al 45,771-acre lease, Sand Hills field, Crane County, and 7 in North Ward district. This new development is in sectors that will have an excess of pipe line capacity by next spring, and possibly removal of production holidays.

Howard County: W. S. Guthrie and Cosden Petroleum Corporation's Allen 2, new pay strike for the Vincent pool, was carrying 4000 feet of oil in the hole while drilling lime at 5570 feet. Production is coming from Lower Clear Fork saturation at 5456-63 feet.

North Texas

Lower Oil Level Found at Dodson

Dual completions for the Dodson pool, situated east of Nocona townsite, Montague County, are in prospect through the opening of a lower oil level from the Bend series by Phillips Petroleum Company's Dodson-Dod 3, T. R. Jackson Survey, with natural potential of 678 barrels through 42/64-inch choke. Production is from conglomerate at 5200-5208 feet in bend, topped at 5018 feet. No test has been made of the regular oil pay topped at 5119 feet, and excluded by landing pipe at 5198 feet. The company's three wells registered gradual slope in structure as production was carried eastward, and the new pay is confined to the east side. Development of the area, which is partially defined by outlying failures, has been accelerated lately with Stanolind Oil & Gas Company starting three tests. Chapman & McFarlin and Sinclair Prairie Oil Company each are operating one rig.

The Texas Company's Cobb 1, southeast outpost for the Bowers pool, eastern Montague County, filled 600 feet with oil after a 5-quart nitro shot at 2448-51 feet, having plugged back from granite at 3394 feet.

A half-mile west expansion for the Hildreth field, which is due to provide the most drilling in the district during the current year, was assured when Continental Oil Company's Coffield 1, NE SE SW Section 51, A. L. Ravia Survey, yielded 575 feet of oil-cut mud without water on incomplete drill-stem test at 6087-6120 feet, Another test was due at 6125 feet. The company's Hildreth 2, nearest producer, is the latest completion, having flowed 1451 barrels potential through ½-in from perforations in Bend saturation at 6113-46 feet. This well is a west offset to the discovery, a dual completion from Bend and 7200-foot Simpson.

Wilbarger County: The Texas Company's Cook 1, east of its recent Main pool discovery in Gunsight lime, rated at one-half million gas from a sand at 1350-1415 feet, and was mudding off gas at 1460 feet.

Hardeman County: Humble Oil & Refining Company's Dodson 1, three miles northwest of Chillicothe, will rely upon the 4200-foot Canyon saturated zone to make a producer after obtaining negative results in plugging back by stages from 7301 feet for production tests through perforations. Latest test at 4955-60 feet yielded a nominal show of gas with 2000 feet of salt water.

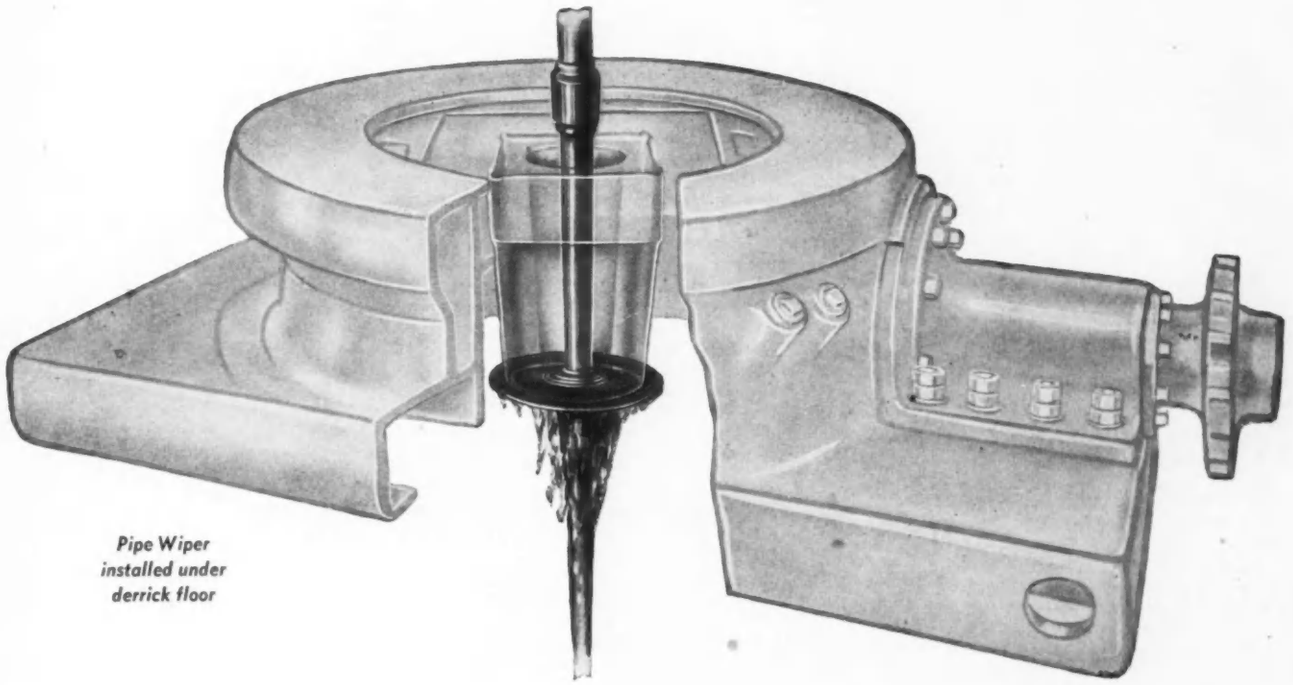
Wildcat Failures: M. P. Springer and C. E. Marshall's Fee 1, fourth deep test northwest of the Walnut Bend field, Cooke County, entered dry Ellenburger at 5760 feet and quit at 5840 feet. In Montague County, Continental Oil Company's First National Bank 1, a mile southeast of its Spencer pool shallow discovery, abandoned in granite at 4403 feet, and the company's Heard 1-A, 1½ miles north of the Mueller pool, measured up at 6699 feet after entering Bend lime at 6367 feet, or 320 feet low.

East Texas

Wood County Wildcat To Test Good Showing

Wood County has entered the new year with a second prospective oil strike from the lower Trinity series. The latest indicated discovery is Gulf Oil Corporation's K. C. Brewer 1, Benjamin Lee Survey, 2½ miles southwest of Winnsboro, which was attempting to free stuck drill pipe pipe for drill-stem test at 8033 feet in the Rodessa section of the Lower Glen Rose. Core taken at 8014-33 feet recovered 12½ feet of broken oil pay. This wildcat has maintained a high structural position for the area, and caused a big royalty play when nominal shows of oil saturation were logged at 5490-5680 feet in Georgetown, topped at 5185 feet with elevation of 479 feet. The Paluxy, entered at 6329 feet, carried water, and top of massive anhydrite was called at 7852 feet.

Shell Oil Company's Whatley 1,



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southeast edge of the Manziel 8-well Paluxy oil pool, was preparing to deepen from 8806 feet after landing smaller surface pipe. This prospect showed porosity in Rodessa at 8494-8504 feet and in Pettit at 8760-68 feet, according to electric log. Drill-stem test at 8758-68 feet yielded 183 feet of 43-gravity oil and 60 feet of oil-cut mud, being first indication that Wood County will produce from Basal Trinity. Sun Oil Company's Johnson 1, inside well, flowed 473 barrels of 29.1-gravity oil potential on ¼-inch from perforations at 6359½-69½ feet but logged 40 feet of pay, topped at 6302 feet. Magnolia Petroleum Company's Lindley 1, deep test for Yantis prospect, was drilling chalk at 3795 feet, having entered Pecan at 2337 feet and Austin at 3790 feet. Moncrief and Hyde's Simmons 1, Golden area, was short of Paluxy objective in reaching contract depth at 6800 feet, and may abandon. Roeser & Pendleton's White 1, near Mineola, entered Georgetown at 6997 feet and was drilling at 7080 feet.

Rusk County: N. H. Wheeless et al's Walker 1, A. G. Walling Survey and east of the East Texas field, showed an abundance of salt water with trace of gas on swabbing test after using 2000 gallons of acid through perforations at 7136-65 feet, confirming water recorded by electric log. Next perforations will be in porosity at 7099-7120 feet in Pettit, topped at 6968 feet with elevation of 394 feet, and also in Rodessa porosity at 6355-6453 feet. Beacon Oil & Refining Company and American Liberty Oil Company's Brown 1, second well for the Henderson pool, increased its gas yield to 3,648,000 feet but the volume of distillate dropped to 141 barrels daily on ¼-inch. Production is from Pettit perforations at 7227-35 and 7244-64 feet.

Smith County: Skelly Oil Company's Chisum 1, pending multi-pay discovery for Sand Flat structure, which is destined to receive a substantial drilling program this year, was awaiting perforations with 5½-inch on bottom at 10,011 feet in Travis Peak, topped at 9954 feet. Electric log recorded Pettit porosity at 9762-76 and 9846-53 feet and Rodessa porosity at 9228-40 and 9255-80 feet with elevation of 432 feet. Tester used at 6972-7007 feet yielded 6000 feet of 24.6-gravity oil from Paluxy, and threat of a blowout prevented use of tester in lower pays. Sun Oil Company's Patterson 1, 3300 feet west by south, was drilling at 6090 feet in Georgetown, topped at 5797 feet, being 105 feet low. However, it is only 32 feet low to C. L. Wickliffe and W. L. Patrick's Hackett-Pure 1, a 9852-foot junked test 3½ miles north of Chisum 1. This junked test showed possible production in Paluxy. Structural position of Chisum 1 improved progressively after cutting a fault in Georgetown. Arkansas Fuel Oil Company's Marsh 12,000-foot southeast outpost, is idle for repairs at 3900 feet, having logged Pecan within range of 3169-3380 feet and top of Gober at 3780 feet with elevation of 417 feet. Phillips Petroleum Company's McMinn 1, 6 miles south of Tyler, entered first Glen Rose at 7765 feet, and was drilling at 7810 feet.

Smackover Tests: Barnsdall Oil Company's Heilborn 1, Bowie County, topped Cotton Valley at 6255 feet with elevation of 285 feet, and was drilling at 6705 feet. In Morris County, Humble Oil & Refining Company's Wright 1 was drilling shale, anhydrite and dolomite at 11,025 feet, probably in Smackover, and the company's Norman 1, Hunt County, logged massive anhydrite at 4312-91 feet, and was drilling at 5040 feet. Humble Oil & Refining Company's Hague 1, Franklin County, cored water at 9020-35 feet, and was drilling at 9240 feet in Cotton Valley. The isolated Robertson County prospect of A. G. Hill et al on the Anderson-Magnolia 245-acre lease, 3 miles northwest of Calvert, remains in hard dry sandstone in drilling at 8556 feet, having entered Travis Peak at 7006 feet.

Deep Starts: Magnolia Petroleum Company's Horwitz 1, J. B. McNeely League, is a scheduled 10,000-foot Travis Peak test for the east side of the company's inactive low-gravity pumper from Woodbine on the Concord structure, Anderson County. In Cherokee County, Humble Oil & Refining Company's Stephens 1, John Jordan Survey, is second try for production in the Larissa pool, opened by the company in 1942 from Pettit at 10,162-10,212 feet. The discovery flows an average of 850 barrels monthly from partially junked hole. The company has unitized the bulk of its 14,000-acre block. In Limestone County, J. G. Phillips and C. W. Killough's Oliver 1, 2 miles northwest of Thelma, is starting up on 5200-foot depth contract.

Quitman Field: Allhands and Briley's Jones-Werner 1, ¾-mile southwest of production, was drilling shale at 6440 feet and above the Paluxy. Shell Oil Company's Cox 1, Jas. Barfield Survey, was drilling dry sand at 6305 feet in Paluxy, topped at 6240 feet.

Southwest Texas

Live Oak County Test Making Gas Producer

Drilling and production still is at a peak in Southwest Texas and the Lower Texas Coast where wildcats are opening new fields, new pays, and new operations are being projected.

Continental Oil Company is testing Somerset Land and Cattle 1 in TT RR 319, 15 miles southwest of George West in Live Oak County. Hole was plugged back from 8547 feet to 8193 feet. The test was made at 8144-93 feet in open hole where a strong pressure was encountered while drilling. This wildcat has assurance of opening a gas field, if not a new oil reserve. Seven-inch casing is set to 8144 feet in Wilcox. The sand with gas odor was found at 8218-23 feet.

Discovery: Indications of the opening of a new field, 3 miles southeast of Seeligson field near Kleberg County, but in Jim Wells County, are seen in Sun Oil Company's Canales 1, in CCSD&RGNG 343. It encountered a sand showing oil at 7221 feet and drilled to 7237 feet. Casing was set and testing is under way. The sand is lower than Seeligson's multiple sands but is about level or slightly higher than the Wilson field discovery, 3 miles southwestward.

Jim Wells County: The North Magnolia City field has been limited on the southeast side, at least temporarily, with E. M. Jones' Evetts 4 abandoned at 5511 feet. This field, which has developed into a multiple-sand area, is being rapidly drilled. A water sand was topped at 5433 feet in Evetts 4. Location is in southeast corner of tract 3, Roberts and White subdivision, Marcelino Lopez Grant.

Bee County: H. B. Zachry Company has completed Brown 1, T. J. Butler Survey, discovery of new field west of old Cosden field and 3 miles west of Pettus townsite. Perforated at 3640-45 feet, flow was 76 barrels daily through 3/16-inch choke. Total depth is 3650 feet, the oil being 41.6 gravity.

New Pay: Sun Oil Company has opened a new gas-condensate pay in Frio zone in Tuttle 1, wildcat 1 mile north of Vicksburg sand production at Blanconia in Bee County. Perforated at 4089-4105 feet, the flow was considerable gas and distillate, no gauge, through 7/64-inch choke. Pay sand was logged at 4087-4115 feet after recovering salt water in the Vicksburg sand around 5000 feet. The hole is bottomed at 5095 feet.

Stanolind Oil & Gas Company is scheduled to complete Fox 1. It logged Frio at 4018-52 feet and Vicksburg at 4965-76 feet. A drill-stem test in Vicksburg recovered 3400 feet of pipe line oil in 15 minutes. Operators set 5½-inch casing on bottom for the test.

Webb County: Phillips Petroleum Company and Texas Gulf Producing Company are making a new test on Bruni Estate 1, wildcat 7 miles southeast of Pescadito in south portion of the county. A test at 4962-72 feet showed around 300,000 feet of gas daily through ¼-inch and ⅜-inch chokes. Carrizo-Wilcox sand was topped at 4965 feet and a gas sand was encountered at 4962-72 feet.

Texas Gulf Coast

Rockland Well Produces From Carrizo-Wilcox

The first oil field of the year has been opened in extreme north portion of Tyler County where Humble Oil & Refining Company has completed Kountze 1 as a commercial producer. The well, which is believed to be producing from the Carrizo-Wilcox sand, flowed 43 barrels of oil in 22 hours through 3/16-inch choke with 350 pounds tubing pressure. Operators are still making tests in attempt to lower gas-oil ratio. Perforations were made at 3415-33 feet after drilling to 8010 feet and plugging back to the sand level. Location of the discovery is one mile northeast of Rockland townsite, lot 1, Emily Smyth Survey, Abstract 792.

Harris County: Sun Oil Company has been swabbing Hirsch 1, wildcat 4 miles northwest of Huffman, and which is opening a new field. On last test, the well flowed 1 barrel of fluid per hour, 90 percent salt water and the remainder oil through ⅛-inch choke. Previously, a test of perforations at 8480-90 feet flowed 1½ barrels hourly through ⅛-inch choke. Total depth is 8821 feet in shale. Location is in James H. Isbell Survey.

Fort Bend County: First activity in months is scheduled for Thompson field where Cecil V. Hagen completed a west side extension and staked location for another. Wolters 1 on a 100-acre lease in Samuel Kenedy Survey, block 8, found oil sand at 5391-5408 feet. Electrical survey was run and casing cemented on bottom for completion. Hagen's second location is on the same tract with a projected depth of 5430 feet.

Brazoria County: The West Columbia field is coming back for a new develop-

ment program on the west side. The Texas Company has been carrying on a steady drilling program and dual completing the wells. Latest producer is Abrams 48, which perforated at 5510-20 feet and flowed 475 barrels through ¼-inch choke. Second perforations were made at 5600-15 feet and the flow was 654 barrels daily through ¼-inch choke. Total depth is 5737 feet with 7-inch casing set to 5735 feet.

Colorado County: Jack W. Frazier and Cities Service Oil Company are setting production pipe in Gay 1, wildcat 3 miles northwest of Columbus, that has indicated opening of a new field. Operators recovered stuck drill pipe at total depth of 8037 feet and reamed the hole to set pipe. Operators found sand in Wilcox zone indicating gas or gas-distillate production at 6775-6800 feet, 6855-70 feet and 7849-55 feet.

South Louisiana

Complete White Lake Well As Distillate Producer

Union Oil Company is preparing to complete its distillate discovery in Whitelake, Vermilion Parish, after running several drill-stem tests that indicated opening of a field. State-Whitelake 1-540, T-14s-2w, last was tested in perforations at 8356-75 feet, recovering dry gas under 2800 pounds working pressure and 3000 pounds shut-in. These perforations were to be squeezed and new shots made at 10,660-675 feet. A test at 10,600-foot level showed gas and condensate. The hole is bottomed at 12,000 feet with 5½-inch casing set to 10,768 feet.

Iberia Parish: Humble Oil & Refining Company has projected a southeast outpost to Avery Island field with staking of Petit Anse 11, SWc 25-13s-5e. Company rig will be used to drill the 9500-foot hole.

New Development: First activity in months is scheduled for the Napoleonville area of Assumption Parish where Tide Water Associated Oil Company is preparing to drill Kessler & Sternfels Unit 1, Section 136-12s-14e. The dome was established to commercial production by George Echols early in 1943, after numerous deep wildcats were drilled, but the new location is the first development since the field was opened.

Amerada Petroleum Corporation has staked location for a second well in Arnaudville field of St. Martin Parish, a field the company opened in December, 1943. The test is Emilie Kidder Unit 1, Section 44-7s-5e. Markley-Bankhead has contract for the 11,000-foot test.

Starks Dome: A major development on the flanks of Starks dome in Calcasieu Parish is indicated where W. T. Burton is reported to have logged more than 100 feet of saturated oil sand in Lutcher-Moore 10, 1 mile northwest of production. Burton is drilling below 11,350 feet and the oil sands were found in the Marine Hackberry of the Frio section. Other shows were reported in the Vicksburg shale section.

Indicating the importance Burton is attaching to the area, he has leased hundreds of acres five miles around the flanks. He also has staked location for Burton 1, 3300 feet south and 660 feet west of the northeast corner of Section 13-9s-13w.

North Louisiana

Revival of Drilling in Old Fields Continues

Locations have been made for five wells to be drilled to the Nacatoch sand in the Bellevue field of Bossier Parish for the third revival of drilling activity in old producing fields of this area during the past month. Drilling programs had previously been announced for Holly in De Soto Parish and Shangaloo in Webster Parish. The Bellevue wells are to be drilled by Princeton Refining Company (B. H. Gray) on the Arkansas Fuel Oil Company's lease in NE NE 15-19n-11w.

Tensas Parish: Possibility of a discovery, with an extensive drilling campaign under way in this area, was seen as Chicago Mill & Land Company's Mutual 1 continued to test the Wilcox formation after plugging back from the Tuscaloosa deep zone. The wildcat, located two miles northwest of production, 1980 feet north and 660 feet west of the southeast corner of Section 12-11n-9e, was reported to be flowing at the rate of 4 barrels of fluid per hour, with some mud and fresh water but no salt water.

A number of outposts in the Holly Ridge deep pool were drilling ahead. Sohio Producing Company's Penrod-Jordan 1, C SW SE 8-11n-10e, northeast of production, was drilling at 7579 feet. Carter Oil Company's Marks 1, C NW NE 19-11n-10e, a north offset, was drilling at 5742 feet. Carter has completed two wells in the area at the 8400-foot level.

Union Producing Company completed the Penrod-Jordan 1, SE NE 19-11n-10e, and was completing Penrod-Jordan 2, NE NE 19-11n-10e, which was drilled to 8430 feet; the company also was waiting for blow-out preventer at 3375 feet at the Penrod-Jordan 3, drilling plug at 465 feet at Penrod-Jordan 4, and building roads to start Penrod-Jordan 5, SW NW 20-11n-10e.

De Soto Parish: Arkansas Fuel Oil Company resumed activity in the Holly field by making location for Maude Scott 3, 430 feet north and 330 feet west of the southeastern corner of the lease in Section 32-14n-13w, which will be drilled to the 2800-foot zone. The well is located west of an old Arkansas Fuel Oil Producer and east of the recent extension well of the Texas Mineral Lands Company on the E. L. Scott lease which reopened drilling in the area. Texas Mineral Lands Company's Lee 1, offset to the Scott well, was reported swabbing at the rate of 20 barrels per day. Several other locations have been staked.

North Caddo Parish: In the Mira wildcat area where extensive exploration of the Pettit zone has been under way during the past year, Ohio Oil Company's Williams 1, 3-22n-15w, after drilling to 5935 feet and running electric test, is awaiting decision to set casing.

Lincoln Parish: Arkansas Louisiana Gas Company has made location for a wildcat gas test, Liner Unit 1, NE SE 36-19n-3w, which is to be drilled to Travis Peak. This company recently completed a wildcat gasser in 19-19n-2w at 5920 feet, and is below 6368 feet on E. L. Hayes 1, Section 11-17n-4w.

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Kids like logic. Only when you give a youngster a reason he can understand is he likely to co-operate. "Mother knows best" may get obedience, but it won't get deference. Grown folks are like kids, only more so. This "mother knows best" stuff we get from the administration and the bureaucrats these days is not easily tolerated. It rankles. But the oil industry will carry on, because oil IS ammunition. And men who TRY PELCO FIRST for supplies and equipment will get old-fashioned pre-new-deal co-operation.

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Drilling on Increase In Proven Areas

Only two completions were recorded in Arkansas during the past week but there were indications of increased drilling activity in proven areas.

Columbia County: No new wildcat operations were announced or started during the week but several wells in the Dorcheat - Macedonia area were at the testing stage.

Two outside tests in the Schuler area are nearing interesting depths. One is Lion Oil Refining Company's Powledge 1 in Section 20-18-17, and the other is Atlantic Refining Company's Murphy 1, Section 2-18-18.

California

Eight Semi-Wildcats in Chico Area, Butte County

A new Northern California gas field, in the Chico area of Butte County, was opened last week and announcements were made of eight new wildcats. In most cases the new exploration jobs more properly would be listed as semi-wildcats, being in areas edging upon, or not far distant from, production in existing fields. Four are in Kern County.

Butte County: Richfield Oil Corporation's Chico 1, Chico area test, was completed as a discovery of a new gas field. On production test of interval 4365-4390 feet, the well blew at a daily rate of about 3,500,000 feet, although during an earlier formation test in which more zone from the same body was open, a flow rate estimated as high as 13,000,000 feet was established.

Fresno County: A test programmed to examine equivalents of McClure, Temblor and Kreyenhagen in the Cantua Creek area has been started by Standard Oil Company. The well, 88-3, is located in SE SE SE 3-17-14.

Universal Consolidated Oil Company's offset to its successful extension of the Raisin City Eocene field, has not been able to make oil production in first tests. Initial flow was reported as about 1,000,000 feet of gas with spray of condensate.

Imperial County: Following The Pure Oil Company's blocking up of large areas at the north edge of Salton Sea, R. S. Rhoades has launched a second wildcat play in Borega Valley. Rhoades is reported to have leased approximately 30,000 acres in the Borega sector, which is about five miles southwest of the Pure block.

Kern County: Richfield Oil Corporation's "Y" zone, or deep sand, northerly extension test in North Belridge, found that formation wet. Plugged back from bottom of 9688 to 9005 feet, the well on flow test made 1200 barrels of 34.9-gravity oil with 640 barrels of water from the "R" zone.

Easterly limits of the newly discovered Tejon Ranch field at a point closer to the discovery well than expected may be defined with completion of Richfield's second offset, A 25-35, now being readied for production test. Top of the oil sand was found 400 feet lower than in the first well.

Michigan

Arenac County Wildcat Indicates New Field

Michigan appeared to be getting off to a flying start in the new year with a discovery producer probable on New Year's Day. Basin Oil Company and Don Rayburns' Weblo 1, S½ NW NW 8-19n-4e, Deep River township, Arenac County, flowed 210 barrels the first day and 239 barrels the second day on test from Dundee lime at 2838-40 feet. Top of the horizon was 2838 feet.

The wildcat is four miles east of the North Adams pool and just north of the Deep River Berea sand gas field. It may be drilled deeper as soon as a casing program is perfected.

Osceola County: Sun Oil Company's Davy D-1, S½ SW SE 36-17n-8w, a semi-wildcat northwest of the Fork oil field, blew out in the Stray sand at 1446-90 feet, indicating presence of commercial gas pay. It will be deepened to test Dundee lime for oil.

Maguire, Inc.'s, Johnson 1, S½ SW SE 36-19n-10w, is producing from 90 to 130 barrels of oil daily following perforating in the Traverse lime section at 3099-3104 feet, to represent nearly a half mile southwest extension of the field.

CHARLES B. CARPENTER, senior petroleum engineer, and A. B. Cook, assistant petroleum engineer, United States Bureau of Mines, will present an informal discussion of the study of the Magnolia Field, Columbia County, Arkansas, before the January 10 meeting of the Gulf Coast section of AIME at Houston.

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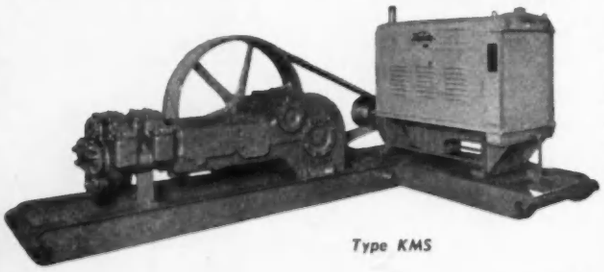

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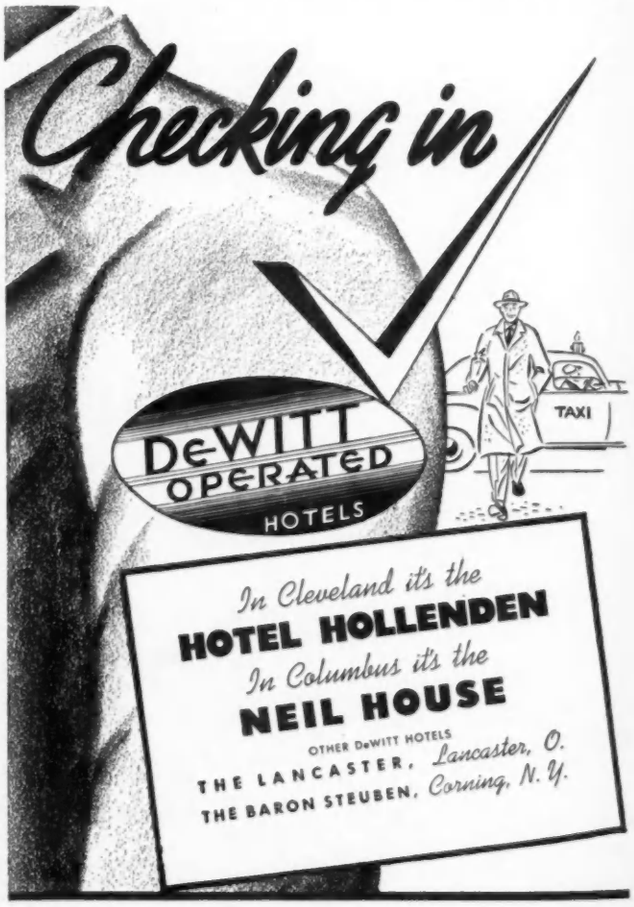

United States Well Completions

ARKANSAS

Columbia County—Dorcheat-Macedonia: McAlester Fuel Co.'s Luther Hunt 2, 15-18-22, dual comp lime and Cotton Valley, flow 110 bbls fr 7600-43, 104 bbls fr 7926-42, td 8602.

Columbia County—Stephens-Smart: Crowe Drilling Co.'s J. and F. Hall C-2, ne ne nw 11-15-20, pay 2479 ft, perf 48 shots 2479-99 ft, pump 50 bbls, td 2550 ft.

Ouachita County: Crowe Drilling Co.'s Westley B-1 nw se sw 7-15-20, pay 3382 ft, perf 47 shots 3381-91 ft, 23 shots 3395-3400 ft, pump 210 bbls, td 4100 ft.

CALIFORNIA

Fresno County—Coalinga: Shell's 166-26, se nw se 26-19-15, pump 229 bbls, perf 3380-3315, 3216-3065 ft, td 3390 ft.

Kern County — Belridge, South: Chanslor Canfield Midway Oil Co.'s B F 11-15, nw nw sw 11-29-21, pump 15 bbls 14-gr oil, 8 wtr, perf 1183-73, 1163-53 ft, td 1350 ft, pb 1280 ft.

Chanslor Canfield Midway Oil Co.'s B F 11-16, nw se sw 11-29-21, pump 20 bbls 14-gr oil, 8 wtr, perf 1240-50 ft, td 1350 ft, pb 1280 ft.

General Petroleum's 38-2, ne sw ne 2-29-21, pump 74 bbls oil, 9 wtr, perf 604-659, 709-799, 879-949 ft, td 970 ft.

Kern County—Buena Vista Hills: Standard's 78-35B, se nw sw 35-31-23, pump 82 bbls 13.1-gr, 190 ft, perf 3535 ft, td 3540 ft.

Kern County—Cymric: Honolulu Oil Corp.'s 8A-25, sw sw sw 25-29-21, pump 31 bbls 11-gr, 15 ft, perf 1356 ft, td 1400 ft, pb 1357 ft.

Kern County—Greeley: Standard's KCL 11-39, ne nw se 18-29-26, flow 910 bbls 34.5-gr, 150,000 gas, 10/64-in, Rio Bravo 11,356 ft, 153 ft perf 11,505 ft, td 11,510 ft.

Kern County — Midway - Sunset: Chanslor Canfield Midway Oil Co.'s 67, se se se 9-32-23, pump 8 bbls oil, 480,000 gas, 32/64-in, perf 2111-2460 ft, td 2525 ft.

North Amer. Oil Consolidated's 84, se nw ne 16-32-23, pump 25 bbls 16-gr, 168 ft perf 1583 ft, Wilhelm 1433 ft, td 1583 ft.

Kern County—Poso Creek-Premier: Standard's 5-37, se ne nw 5-28-27, pump 110 bbls 13.1-gr oil, 40 wtr, 88 ft perf 2658 ft, td 2740 ft, pb 2690 ft.

Los Angeles County — Del Valle: Ohio's Vasquez 8, sw sw se 17-4-17, flow 648 bbls 29.7-gr, 250,000 gas, 24/64-in, 875/1300 lbs, perf 6185-70, 6070-6160, 5850-5930 ft, oil sand 6158 ft, Videgain zone 6075 ft, otd 6242 ft, pb 2677 ft, redrld 6195 ft.

Los Angeles County—Montebello: Standard's Baldwin 112, sw sw nw 6-2-11, pump 103 bbls 15.9-gr oil, 110 wtr, 521 ft perf 2609 ft, td 2612 ft.

Los Angeles County — Newhall - Potrero: Barnsdall's R.S.F. 41, 27-4-17, 127 bbls oil, 18 wtr, 3264-in, 415 ft 5-in incl perf 7676 ft, td 7678 ft.

Los Angeles County—Oak Canyon: Hathaway Co.'s USA-VC, sw ne nw 31-5-17, brown shale, abnd 3209 ft.

Los Angeles County—Richfield: Standard's A.U. 2-2, 193 ft n on e/l fr sec Anaheim Union ppty thence 255 ft w al r/a, 34-3-9, pump 102 bbls 10.8-wet gr oil, 50 wtr, 75 ft perf 3559 ft, td 3575 ft.

Los Angeles County — Wilmington: Long Beach Oil Dev. Co.'s "W" 67, 1080 ft nely on nl Seaside fr e side 27th Ave thence 1961 ft sely at r/a, pump 188 bbls 17.4-gr, 296 ft perf 2951 ft, td 2956 ft.

Long Beach Oil Dev. Co.'s "X" 15, 938 ft s 841 ft w nec Parcel "X," pump 242 bbls 21.3-gr, perf 2925-3412, 3510-3967 ft, td 3975 ft.

Orange County — Huntington Beach: (Old well redrilled) Termo Co.'s Fee 5, flow 840 bbls 20.3-gr, 23/64-in, 240/760 lbs, 451 ft perf 3251 ft, otd 4848 ft, pb 2554 ft, redrilled 3251 ft.

Santa Barbara County—Lompoc: (Old well deepened) Union's Purisima 18, ne se sw 35-8-34, pump 373 bbls rate 19.4-gr, 221 ft perf 2762 ft, otd 2630 ft, deepened to 2762 ft.

Ventura County—Piru: Pacific Western's 17, Rancho Temescal, 4-4-18, pump 150 bbls 22.4-gr, 779 ft perf 3410 ft, "G" zone 2650 ft, "F" zone 2950 ft, td 3410 ft.

Ventura County—Shiells Canyon: Texas Co.'s 143, sw ne se 4-3-19, pump 37 bbls 33.3-gr, perf 2612-2872 ft, td 2905 ft.

CALIFORNIA WILDCATS

Kern County—Failures: Seaboard's Garrison Davis 1, sw nw sw 30-29-29, Edison area, gray sand, abnd 4103 ft.

Standard's 22-35, se nw nw 35-30-22, McKittrick area, shale, abnd 3710 ft.

Ring Oil Co.'s Meyers 1, nw sw se 28-26-28, Mount Poso area, gray sand, spots oil, Vedder sand 1460 ft, abnd 1495 ft.

General Petroleum's Malta 1, sw se se 14-28-28, Round Mountain area, abnd 2838 ft, converting to wtr well.

Ventura County—Failure: Wilshire Annex Oil Co.'s Ventura Realty 1, nw ne sw 1-3-19, gr sand and sh, abnd 5074 ft.

ILLINOIS
Week Ending December 11, 1943

Clay County: H. M. Williams et al's Chasteen 1, se ne nw 30-3n-6e, Ben 2702-11 ft, 35 bbls, 2712 ft.

British American's B. T. Dannells 1, nw se sw 2-3n-7e, abnd 2999 ft.

W. C. McBride's Patton 2, nw nw nw 11-3n-7e, Cyp 2606-15 ft, 35 bbls, 2616 ft.

Franklin County: Ohio's U. S. Coal & Coke Co. 3, nw nw se 12-6s-3e, abnd 3102 ft.

Hamilton County: Levy & Paxman's Sneed Comm 1, ne nw nw 20-4s-7e, AV 3272-81 ft, 60 bbls, 3286 ft.

Texas Co.'s Merritt Davis 1, nw sw ne 18-6s-6e, AV 3140-63 ft, 169 bbls, 3329 ft.

Jefferson County: Mohawk Drlg. Co. et al's Pepple-Wood Comm 1, c ne nw 24-2s-4e, McCl 3086-92 ft, 3097-3103 ft, 830 bbls, 3109 ft.

Magnolia's J. A. Lisenby 1, ne ne se 18-3s-3e, AV 2664-69 ft, 8 bbls, 2685 ft.

Lawrence County: C. E. Skiles' Ireland 2, se ne nw 27-2n-12w, abnd 2012 ft.

Marion County: Texas Co.'s A. Sweeney 11, ne ne nw 20-2n-2e, Dev 3505-15 ft, 3555-3560 ft, 42 bbls, 3566 ft.

Texas Co.'s J. Canull 16, ne sw se 31-2n-2e, Dev 3308-47 ft, Trent 4176-4480 ft, 25 bbls, 4579 ft.

Wabash County: Dean & Morton's E. H. Dunkel 2, sw nw se 5-1s-12w, Cyp 2040-57 ft, 66 bbls, 2305 ft.

First Nat'l Pet. Trust's Shaw-Courter 3, sw ne se 7-1s-12w, Cyp 2055-73 ft, 160 bbls, 2075 ft.

Magnolia's Campbell Heirs 4, se ne ne 7-1s-12w, Cyp 2002-25 ft, 2061-69 ft, 31 bbls, 2070 ft.

C. R. Craft's E. Viehman 1, nw se ne 8-1s-12w, Cyp 1987-2002 ft, 40 bbls, 2010 ft.

Olds Oil Co.'s Long 2, ne nw nw 16-1s-12w, abnd 2324 ft.

Olds Drlg. Co.'s William Long 3, nw ne nw 16-1s-12w, abnd 2328 ft.

O'Mera Brothers' J. C. Utter C-1, ne ne ne 17-1s-12w, McCl 2310-22 ft, 240 bbls, 2327 ft.

Wayne County: Texas Co.'s W. Jones 2, ne ne sw 9-1s-6e, AV 3040-43 ft, 92 bbls, 3045 ft.

Deep Rock's Clyde Young 2, ne ne 32-1s-7e, Rosi 3253-56 ft, 468 bbls, 3270 ft.

Cities Service's Ruedger 1, nw ne se 32-2s-9e, McCl 3312-18 ft, 828 bbls, 3360 ft.

Nat'l Refg. Co.'s W. S. Lawrence 2, w½ sw ne 32-2s-9e, Rosi 3260-68 ft, 118 bbls, 3328 ft.

Pure's Van Fossen-Brown Cons. 1, se sw 14-1n-8e, McCl 3047-66 ft, 204 bbls, 3160 ft.

Pure's Z. I. Zimmerman 1, nw nw nw 36-2n-7e, AV 2938-51 ft, 76 bbls, 3000 ft.

White County: W. H. Brown's J. Haefele 1, n½ nw ne 30-3s-9e, abnd 3525 ft.

Eason Oil Co.'s Clark 4, nw ne nw 30-4s-11e, abnd 2821 ft.

Carter-Pure's E. A. Pyle "A" 3, se nw se 18-6s-9e, AV 2921-28 ft, 2930-36 ft, 48 bbls, 2937 ft.

Carter-Pure's E. A. Pyle "A" 4, nw ne se 18-6s-9e, AV 2905-11 ft, 14 bbls, 2927 ft.

Carter Oil Co.'s Urban Holmes 2, nw se nw 19-6s-9e, abnd 2963 ft.

B. B. & M. Drlg. Co.'s L. Barnes 1, se se se 12-6s-10e, Bridgeport 1306-28 ft, 25 bbls, 1328 ft.

Wiser & Sohio's Geo. Meyer 1, ne ne sw 28-6s-10e, L O'H 2927-35 ft, 210 bbls, 3053 ft.

*ILLINOIS WILDCATS
Week Ending December 11, 1943

Clark County—Failure: Cornelius & Collins' Sackrider 1, se se sw 13-9n-12w, abnd 1500 ft.

Edwards County—Discoveries: Superior's L. Lipper 1, nw ne sw 28-1s-14w, L Cyp 2692-2738 ft, 209 bbls, 3091 ft.

Superior's A. Jack 1, se sw se 5-2s-14w, Ben 2836-67 ft, 16 bbls, 3142 ft.

Lewis Prod. Co.'s L. Dunk 1-A, ne se se 36-2s-10e, Walts 2395-2401 ft, 15 bbls, 2455 ft.

Edwards County— Failure: Phillips' Sam Fiefer 1, se ne se 6-3s-10e, abnd 3434 ft.

Jasper County—Failure: Big Chief Drlg. Co.'s Keach 1, e½ ne se 27-8n-9e, abnd 2799 ft.

Marion County—Discovery: Central Pipe Line et al's H. E. Littleton 1, ne sw 22-5n-4e, Ben 2338-48 ft, 27 bbls, 2359 ft.

Wabash County — Failure: Continental's Reisinger 1, sw ne ne 4-2s-13w, abnd 2738 ft.

Washington County—Failure: Werner Bros.' Mueller 1, nw nw ne 3-2s-3w, abnd 1578 ft.

Wayne County—Failures: Ryan & Fortner's Woods 1, se ne nw 13-2s-9e, abnd 3411 ft.

H. Raman's Richison Cons. 1, se sw 13-1n-6e, abnd 3328 ft.

Wayne County—Discovery: Texas Co.'s E. Hoffee 1, ne ne ne 9-1n-6e, L O'H 3192-97 ft, and McCl 3254-57 ft, 140 bbls, 3322 ft.

White County—Discovery: C. E. Skiles et al's H. Hoerner 1, e½ nw ne 25-3s-10e, Ben 2924-34 ft, 65 bbls, 3182 ft.

ILLINOIS
Week Ending December 18, 1943

Clay County: Texas Co.'s H. Byers 4, ne ne se 22-5n-5e, AV 2342-52 ft, 85 bbls, 2356 ft.

Texas Co.'s J. Louden 2, nw se ne 22-5n-5e, AV 2347-54 ft, 104 bbls, 2357 ft.

H. S. Williams' Estey McGhee 3, se nw se 22-5n-5e, AV 2346-56 ft, 77 bbls, 2356 ft.

Edwards County: Fred A. Noah's Edwards County Poor Farm 1, ne sw nw 6-2s-11e, L O'H 3102-08 ft, 41 bbls, 3166 ft.

Hamilton County: Nat'l Assoc. Pet.'s Ira Peters 2, ne nw sw 26-4s-7e, AV 3283-97 ft, 166 bbls, 3308 ft.

Ohio Oil Co.'s M. York 2, ne sw sw 26-4s-7e, AV 3308-17 ft, 15 bbls, 3541 ft.

W. O. Morgan's E. H. Horner 1, ne nw ne 27-4s-7e, AV 3274-96 ft, 35 bbls, 3306 ft.

Nat'l. Assoc. Pet.'s Hawthorne 1, ne ne ne

Wells Completed in United States in Week Ended January 8, 1944

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second issue of each month. More detailed data on wildcats published in third issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Gas	†Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS *Oil	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	Cumulative: This Year	Last Year
Arkansas	1				1						1		1	4
California	20			1	21				5	5	26	21	47	37
Colorado														3
Illinois	22		1	8	31				4	4	35	50	85	81
Indiana	6	1		1	8				3	3	11	7	18	12
Kansas	11			11	22		1		10	11	33	56	89	67
Kentucky	4			2	6						6	11	17	9
Louisiana	2	1		1	4				3	3	7	7	14	16
North Louisiana	1	1			2				2	2	4		4	2
South Louisiana	1			1	2				1	1	3	7	10	14
Michigan	5			2	7				2	2	9	17	26	14
Mississippi														10
Montana												5	5	12
New Mexico		1			1						1	7	8	8
New York	15			10	25						25	22	47	35
Ohio	1			2	3						3	4	7	42
Oklahoma	14	1	2	9	26	1	2	1	2	5	32	27	59	72
Pennsylvania	28	3	14	2	47						47	48	95	93
Texas	46	2		10	58	1	4	1	27	32	91	88	179	145
Rest of E. Texas	1				1				3	3	4	8	12	7
North Texas	9			5	14		3		7	10	24	20	44	38
W. Central Tex.				2	2			1	1	2	4	4	8	10
West Texas	14				14	1			5	5	20	14	34	30
Tex. Panhandle	2				2				1	1	3	5	8	11
G. Coast, Upper	7			2	9				4	4	13	9	22	7
G. Coast, Lower	7	2			9		1		3	4	13	20	33	24
Southwest Texas	5			1	6				2	2	8	6	14	17
S. Central Tex.	1				1				1	1	2	2	4	1
West Virginia	3	13		1	17						17	26	43	44
Wyoming												1	1	7
Total U.S.	178	22	17	60	277	2	7	2	56	65	344	397	741	890

* Includes distillate wells. † Includes salt water disposal wells.

34-4s-7e, AV 3296-3314 ft, 488 bbls, 3314 ft.

Jefferson County: Bell Bros.' Indiana Nat'l Bank "B" 1, e½ sw ne 24-1s-3e, McCl 2773-79 ft, 150 bbls, 2882 ft.

Bell Bros.' R. Sledge 1, e½ nw se 24-1s-3e, abnd 2849 ft.

Magnolia's Knox Gee 1, ne se ne 7-3s-3e, abnd 2806 ft.

Richland County: J. S. Dow's DeBoeuf 1, nw sw nw 17-2n-11w, abnd 2300 ft.

Wabash County: A. Baldwin's G. Dunkel 1, ne se nw 5-1s-12w, Penn 1493-1511 ft, 150 bbls, 1511 ft.

C. R Craft's Kitchene 1, se sw nw 8-1s-12w, Cyp 2045-62 ft, 75 bbls, 2120 ft.

Texas Co.'s C. Kuhn 5, sw sw nw 8-1s-12w, Cyp 2039-52 ft, 70 bbls, 2053 ft.

Texas Co.'s Geiger-Steckler Comm 2, sw sw sw 9-1s-12w, Cyp 2002-15 ft, 104 bbls, 2025 ft.

Shell's G. E. Risley 1, sw nw sw 29-1n-12w, Rose 2331-39 ft, 4 bbls, 2388 ft.

Shell's Thrapp-Dougherty Comm. 1, sw nw nw 29-1n-12w, Cyp 2029-41 ft, McCl 2327-31 ft, 2357-62 ft, 44 bbls, 2370 ft.

Wayne County: Pure's Amos Peddicord "A" 2, ne sw sw 9-1s-6e, abnd 3080 ft.

Texas Co.'s J. G. Boggs 8, nw sw 9-3s-7e, AV 3195-3208 ft, McCl 3346-49 ft, 86 bbls, 3361 ft.

Roy R. Powers' Murphy 1, nw nw nw 18-1n-6e, abnd 3147 ft

Pure's H. Michels 1, nw sw sw 25-2n-7e, AV 2917-40 ft, 349 bbls, 2960 ft.

White County: Sun's C. W. Ford "B" 7, ne nw ne 21-4s-14w, abnd 2861 ft.

Superior's H. C. Ford et al F-2, ne nw ne 34-4s-14w, Walts 2100-52 ft, Cyp 2572-2610 ft, 58 bbls, 2834 ft.

Jarvis & Marcell's Spencer 12, se ne sw 31-4s-11e, McCl 3005-11 ft, 288 bbls, 3109 ft.

W. G. Fortner's S. A. Johnson 1, ne ne ne 13-6s-10e, abnd 1344 ft.

ILLINOIS WILDCATS

Week Ending December 18, 1943

Bond County—Failure: T. N. Conray's Foreman 1, se sw sw 18-4n-3w, abnd 1090 ft.

Clay County—Failure: Eason Oil Co. et al's C. Tucker 1, sw sw ne 2-4n-6e, abnd 2977 ft.

Franklin County—Failures: N. V. Duncan's Franklin Coal Co. 1, nw nw sw 5-5s-3e, abnd 3092 ft.

J. V. Canterbury's S. E. Webb 1, nw sw sw 4-5s-4e, abnd 3319 ft.

Bell & Zoller Mining's Ziegler Coal & Coke 3, se sw sw 23-7-1e, abnd 2868 ft.

Jefferson County—Failure: J. N. Harsh's C. E. Fuller 1, sw ne ne 1-2s-1e, abnd 2080 ft.

Marion County—Failure: Jarvis & Marcell's Gabriel 1, nw nw se 28-3n-3e, abnd 2494 ft.

Richland County—Failure: LaFayette Funk & Central P. L. Co.'s M. Tarpley 1, ne ne nw 22-2n-14w, abnd 3110 ft.

St. Clair County—Failure: C. W. Young's McCurdy 2, nw sw sw 29-3s-6w, abnd 629 ft.

Washington County—Failure: R. C. Tagerson's Shubert 1, sw nw nw 18-3s-4w, abnd 1705 ft.

ILLINOIS

Week Ending December 25, 1943

Clark County: G. A. Isaacson's V. Blakeman 1, sw ne ne 13-9n-14w, Penn Sd 405-38 ft, 15 bbls, 438 ft.

Clay County: F. A. Bridge's Landreth 2, se sw ne 17-5n-5e, AV 2328-38 ft, 20 bbls, 2350 ft.

Shell's Moss 3, se nw sw 14-5n-5e, Ben 2283-94 ft, AV 2331-41 ft, 97 bbls, 2346 ft.

W. C. McBride's F. E. Smith 1, nw ne nw 11-3n-7e, Cyp 2594-2616 ft, 60 bbls, 2616 ft.

W. C. McBride's Clark 2, se se ne 3-3n-7e, Cyp 2590-2608 ft, 35 bbls, 2617 ft.

J. J. Lynn's Joplin 1, se nw sw 30-3n-6e, Ben 2699-2710 ft, 24 bbls, 2712 ft.

Edwards County: Superior's L. Lipper A-1, nw nw sw 28-1s-14w, abnd 3113 ft.

Superior's G. A. Bender 1, sw ne nw 29-2s-14w, Cyp 2785-90 ft, AV 3057-70 ft, McCl 3139-40 ft, 3160-63 ft, 131 bbls, 3179 ft.

Lewis Prod. Co.'s R. Judge 1, sw ne se 36-2s-10e, Walts 2404-22 ft, 287 bbls, 2429 ft.

Effingham County: P. D. Lynch's Robinson 1, se se ne 33-6n-5e, abnd 2507 ft.

C. Crump's John Habbe 2, se sw sw 33-6n-7e, Cyp 2516-28 ft, 10 bbls, 2842 ft.

Hamilton County: Texas Co.'s E. L. Denny 1, ne se se 13-6s-6e, TS 2442-55 ft, 84 bbls, 2455 ft.

Texas Co.'s J. A. Green 1, ne sw nw 20-4s-7e, abnd 3447 ft.

Ohio's M. E. Peters 1, ne ne ne 27-4s-7e, abnd 3326 ft.

Jefferson County: Eason Oil Co.'s J. T. Henry 1, se se 13-2s-4e, McCl 3058-62 ft, 3069-3082 ft, 457 bbls, 3089 ft.

Magnolia's Vernon Pepple 1, ne ne 24-2s-4e, McCl 3071-75 ft, 3081-83 ft, 3092-95 ft, 83 bbls, 3156 ft.

Magnolia's Badgett et al 1, ne nw se 7-3s-3e, abnd 2870 ft.

Lawrence County: Olds Drlg Co 's Lutheland 1, nw se sw 34-2n-12w, abnd 2234 ft.

Marion County: Texas Co.'s Fricke 4, nw ne ne 16-1n-2e, Ben 1900-03 ft, 92 bbls, 1908 ft.

Richland County: Pure's R. S. Shatto 1, se nw sw 30-3n-9e, McCl 2977-81 ft, 2996-97 ft, 3034-35 ft, 619 bbls, 3062 ft.

Gulf's Sterchi 4, nw ne nw 36-5n-10e, abnd 3055 ft.

Wabash County: C. E. Skiles' Wabash Co. Land Co. 1, ne sw se 5-1s-12w, Cyp 1988-97 ft, 40 bbls, 2057 ft.

Magnolia's Campbell Heirs 5, nw se ne 7-1s-12w, Penn 1499-1512 ft, Cyp 2028-35 ft, 128 bbls, 2091 ft.

Olds Drlg. Co.'s Trapp-Cleary Comm 1, sw sw sw 8-1s-12w, Cyp 2021-33 ft, 60 bbls, 2343 ft.

Texas Co.'s Stein 1, ne se nw 8-1s-12w, McCl 2328-35 ft, 2337-42 ft, 109 bbls, 2349 ft.

Superior's E. & C. Crowe Unit 12, sw se nw 9-1s-12w, Biehl 1494-1525 ft, McCl 2335-40 ft, 40 bbls, 2355 ft.

Superior's E. & C. Crowe Unit 13, ne se nw 9-1s-12w, Biehl 1474-96 ft, Cyp 2035-44 ft, 50 bbls, 2047 ft.

Texas Co.'s Geiger-Steckler Comm 1, nw sw sw 9-1s-12w, McCl 2306-11 ft, 152 bbls, 2312 ft.

Cameron Oil Co.'s J. C. Utter 2, sw ne ne 17-1s-12w, McCl 2318-27 ft, 200 bbls, 2328 ft.

Wayne County: Collins Bros.' F. Weir 1, nw sw se 22-1s-8e, McCl 3153-58 ft, 3162-64 ft, 185 bbls, 3164 ft.

New Penn Dev. Corp.'s Fee 1, nw sw 28-2s-9e, L O'H 3256-61 ft, Rosi 3282-87 ft, 250 bbls, 3345 ft.

Cities Service's Zuber 1, nw sw se 32-2s-9e, AV 3212-26 ft, 60 bbls, 3347 ft.

Cities Service's Vaught 2, nw nw nw 33-2s-9e, L O'H 3256-60 ft, Tosi 3283-86 ft, 48 bbls, 3356 ft.

Texas Co.'s T. J. Misenhimer 1, nw se se 4-1n-6e, abnd 3319 ft.

Texas Co.'s Klein 1, se nw nw 10-1n-6e, abnd 3324 ft.

Pure's T. R. Michels Cons. "A" 1, se sw se 26-2n-7e, abnd 3130 ft.

White County: Shulman Bros.' A. J. Poorman 1, se sw sw 18-3s-8e, AV 3235-60 ft, 44 bbls, 3423 ft.

Tide Water's Dennis "B" 2, nw se sw 18-4s-11e, Deg 2001-22 ft, Cyp 2727-42 ft, 18 bbls, 3005 ft.

Jarvis & Marcell's Fitzgerald's 1-A, nw nw se 30-4s-11e, Ben 2808-25 ft, 45 bbls, 2827 ft.

Pure's E. A. Pyle "C" 1, se se sw 18-6s-9e, AV 2949-68 ft, 38 bbls, 2974 ft.

Great Lakes Carbon's J. Hankins 1, n½ nw se 28-6s-10e, abnd 3032 ft.

Great Lakes Carbon's White County Bank 1, sw se nw 28-6s-10e, TS 2271-84 ft, 89 bbls, 2300 ft.

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P. O. Box 2608 Houston 1, Texas

ILLINOIS WILDCATS
Week Ending December 25, 1943

Crawford County—Failures: Ryan Oil Co.'s A. Boyer 1, sw ne nw 11-8n-12w, abnd 2899 ft.

Joe Dawson et al's George 1, nw ne ne 18-8n-13w, abnd 1285 ft.

Effingham County—Failure: A. J. Hammer's Ruskin 1, se ne se 4-7n-6e, abnd 2550 ft.

Fayette County — Failure: Paul Doran's Mabry & White 1, ne nw ne 9-6n-1e, abnd 1818 ft.

Jefferson County—Discovery: J. W. Murchison's Sledge 1, se se se 34-3s-2e, Rosi 2791-2805 ft, 33 bbls, 2805 ft.

Wayne County—Failure: Comanche Oil Co.'s Felix Heirs 1, se se 2-2s-6e, abnd 3403 ft.

Wayne County—Discovery: Robinson-Puckett's Gordon-Muhlback 1, c se ne 1-1n-8e, Rosi 3088-97 ft, McCl 3112-19 ft, 127 bbls, 3128 ft.

ILLINOIS
Week Ending January 1, 1944

Clay County: W. C. McBride's Phillips 3, nw nw sw 2-3n-7e, Cyp 2597-2606 ft, 33 bbls, 2606 ft.

W. C. McBride's A. H. Keck 4, nw ne nw 35-4n-7e, Cyp 2604-18 ft, 60 bbls, 2618 ft.

Shell's Moss 4, sw nw sw 14-5n-5e, Cyp 2134-48 ft, PC 2256-64 ft, AV 2336-56 ft, 210 bbls, 2356 ft.

Leland Waggoner's Smith 1, nw nw sw 23-5n-5e, AV 2346-58 ft, 140 bbls, 2358 ft.

Cumberland County: K. W. Kilpatrick's Elmo Morris 1, ne se ne 27-11n-7e, abnd 2175 ft.

Edwards County: Morrison & Nash's F. R. Wick 1, ne sw se 24-2s-10e, Ben 2979-88 ft, 56 bbls, 2990 ft.

N. V. Duncan's Cullison 1, s½ ne se 32-2s-10e, McCl 3364-68 ft, 60 bbls, 3373 ft.

Deep Oil Co.'s Crackel-Franklin 1, s½ sw nw 33-2s-10e, abnd 3329 ft.

Gallatin County: Oil Management's Arensman 1, ne sw ne 15-8s-10e, Cyp 2380-93 ft, 260 bbls, 2396 ft.

Oil Management's Arensman 3, nw sw ne 15-8s-10e, TS 2068-80 ft, 60 bbls, 2086 ft.

Hamilton County: E. B. Gill Drlg. Co.'s Oliver-Sneed 1, se nw sw 14-4s-7e, abnd 3466 ft.

Nat'l. Assoc. Pet. Co.'s Ira Peters 1, sw nw sw 26-4s-7e, abnd 3472 ft.

Texas Co.'s J. Barnett 1, sw ne se 27-4s-7e, AV 3308-24 ft, 280 bbls, 3335 ft.

Texas Co.'s Johnson Comm. 1, se sw se 26-6s-6e, AV 3087-3104 ft, 121 bbls, 3107 ft.

Jasper County: Gulf's J. W. Strouse 1, nw se 28-6n-9e, McCl 3121-30 ft, 27 bbls, 3160 ft.

Big Chief Drlg. Co.'s McCormick 1, se nw ne 33-6n-9e, abnd 3234 ft.

Jefferson County: Texas Co.'s G. M. Riggs 1, ne se se 13-1s-3e, McCl 2840-46 ft, 292 bbls, 2870 ft.

Mohawk Drlg. Co.'s H. E. Pepple 1, nw ne 24-2s-4e, McCl 3094-3101 ft, 27 bbls, 3116 ft.

Madison County: Oberling & Bryant's Wells 1, se se nw 16-3n-6w, Trenton 2385-94 ft, 17 bbls, 2394 ft.

Rockhill Oil Co. et al's L. Mayer 2, se se ne 16-4n-6w, Dev 1762-66 ft, 50 bbls, 1780 ft.

Marion County: Texas Co.'s S. D. Kell 1, ne se ne 9-1n-2e, abnd 2192 ft.

Zephyr Drlg. Co.'s Mercer 3, nw sw nw 34-2n-2e, Ben 1868-82 ft, 42 bbls, 1882 ft.

Montgomery County: Carl & K. D. Kiester's L. Moore 4, nw se se 12-10n-5w, Potts 581-97 ft, 8 bbls, 597 ft.

Shelby County: Powell & Yakey's Schoef Heirs 1, se se sw 22-10n-5e, AV 1948-54 ft, 16 bbls, 1956 ft.

Wabash County: First Nat'l Pet. Trust's Shaw-Courter 4, nw se se 7-1s-12w, Cyp 2126-38 ft, 35 bbls, 2148 ft.

Texas Co.'s W. P. Steckler 5, sw nw se 8-1s-12w, Biehl 1490-1502 ft, TS 1702-15 ft, 40 bbls, 2384 ft.

Superior's J. Riggs 1, nw ne se 8-1s-12w, Cyp 1995-2010 ft, 75 bbls, 2017 ft.

Superior's J. Riggs 2, ne nw se 8-1s-12w, Cyp 2013-27 ft, 85 bbls, 2030 ft.

Superior's J. H. Zimmerman 1, se sw ne 8-1s-12w, Cyp 1998-2015 ft, 142 bbls, 2015 ft.

George & Wrather's Zimmerman 5, se ne nw 9-1s-12w, Biehl 1480-97 ft, Cyp 2025-42 ft, 175 bbls, 2044 ft.

George & Wrather's Zimmerman 6, nw sw ne 9-1s-12w, Cyp 2037-46 ft, 90 bbls, 2051 ft.

George & Wrather's Zimmerman 7, nw ne sw 9-1s-12w, abnd 1539 ft.

Superior's E. & C. Crowe Unit 2, sw ne nw 9-1s-12w, Biehl 1498-1508 ft, 15 bbls, 2358 ft.

Sohio's M. Kerwin 3-X, nw sw sw 14-3s-14w, abnd 2803 ft.

Wayne County: Texas Co.'s M. E. Heaton 6, nw se se 17-3s-7e, Rosi 3301-06 ft, L O'H 3332-40 ft, McCl 3360-66 ft, 10 bbls, 3370 ft.

United Prod. Co.'s R. Bullard 1, sw se 4-1n-6e, abnd 3312 ft.

Eagle Drlg. Co.'s Flexter 1, c ne ne 4-1n-7e, abnd 3123 ft.

Pure's J. O. Van Fossen "B" 1, nw ne 23-1n-8e, McCl 3152-57 ft, 3166-70 ft, 45 bbls, 3190 ft.

White County: Great Lakes Carbon Corp.'s White County Bank 2, ne se nw 28-6s-10e, TS 2273-92 ft, 129 bbls, 3080 ft.

ILLINOIS WILDCATS
Week Ending January 1, 1944

Clinton County — Failure: Jack Darnell's Phien 1, nw ne sw 19-1n-3w, abnd 968 ft.

Franklin County—Discovery: J. W. Murchison's Franklin County Coal Co. 1, ne sw se 11-5s-2e, L O'H 2752-74 ft, 8 bbls, 2942 ft.

Hamilton County—Failure: Alexandria Fruit Co.'s Wright 1, w½ ne sw 34-5s-5e, abnd 3491 ft.

Jasper County—Failure: G. H. Schrock et al's Jansen 1, n½ ne sw 29-8n-8e, abnd 2808 ft.

Jefferson County—Failures: E. A. Oberling's McClintock 1, sw ne nw 24-2s-2e, abnd 2884 ft.

Dickerson & Leivernecht's Minor 1, se se sw 3-2s-3e, abnd 2926 ft.

E. M. Self et al's Jeff Oil & Gas Co. 2, sw ne ne 32-3s-2e, abnd 2712 ft.

Lawrence County — Failure: George & Wrather et al's Effert 1, ne se nw 26-4n-12w, abnd 2012 ft.

Randolph County — Failure: Southwestern Ill. Coal Corp's Cleland 1, ne se nw 25-5s-5w, abnd 2566 ft.

Sangamon County—Failure: C. H. Davis' J. W. Taft 1, n½ se ne 15-15n-3w, abnd 1850 ft.

White County—Failure: Jarvis & Marcell's G. Tollman 1, nw ne ne 26-3s-10e, abnd 3166 ft.

ILLINOIS
Week Ending January 8, 1944

Clay County: J. J. Lynn et al's Dean 1, se sw nw 30-3n-6e, Ben 2702-11 ft, 45 bbls, 2714 ft.

Robinson & Puckett's Toole 1, se se se 27-4n-7e, abnd 3027 ft.

W. C. McBride's Cooper 1, nw se nw 35-4n-7e, Cyp 2598-2606 ft, 25 bbls, 2606 ft.

Texas Co.'s H. Byers 5, ne sw ne 22-5n-5e, AV 2350-58 ft, 60 bbls, 2358 ft.

Edwards County: Texas Co.'s Moats-Luthe Comm. 1, c nw nw 10-1n-10e, McCl 3258-63 ft, 226 bbls, 3264 ft.

Texas Co.'s Pamp-Sager Comm. 1, sw ne sw 34-2n-10e, abnd 3350 ft.

Effingham County: Jarvis & Marcell's Shirley 2, sw nw sw 35-6n-5e, 2551 ft.

Kingwood Oil Co.'s J. W. Beyers 2, nw nw nw 35-6n-5e, AV 2355-66 ft, 14 bbls, 2450 ft.

Franklin County: E. S. Adkins' T. M. McKenie 7, se nw nw 30-6s-3e, TS 2141-64 ft, 45 bbls, 2165 ft.

E. S. Adkins' Sharkey 1-T, nw sw ne 30-7s-3e, L O'H 2740-72 ft, 97 bbls, 2976 ft.

Hamilton County: Bailey Vinson's Oglesby Comm. 1, nw ne sw 17-6s-6e, AV 3127-41 ft, 60 bbls, 3141 ft.

Nash Redwine's G. O. Cotter 1, se se sw 34-6s-6e, AV 3150-53 ft, 3156-61 ft, 40 bbls, 3167 ft.

Jefferson County: Gulf's D. McNail 2, nw sw nw 24-1s-4e, McCl 2921-27 ft, 15 bbls, 2935 ft.

Gulf's C. W. Hall 1, ne se nw 6-3s-3e, L O'H 2755-61 ft, McCl 2833-37 ft, 16 bbls, 2845 ft.

Lawrence County: Smith & Nye's Anna Ramsey 2, nw ne sw 23-2n-12w, abnd 1920 ft.

Sam Malias' E. Cooper 1, se sw nw 27-2n-12w, abnd 2026 ft.

Madison County: Rockhill et al's Pence 2-A, ne se ne 16-4n-6w, swd, 1140 ft.

Richland County: Pure's L. H. O'Dell 1, c se ne 25-3n-8e, McCl 2973-79, 2981-83 ft, 455 bbls, 3055 ft.

Wabash County: Texas Co.'s R. Stine 2, nw sw se 5-1s-12w, Cyp 1983-97 ft, 177 bbls, 2000 ft.

C. M. Margrave et al's H. Baumgart 1, se se se 6-1s-12w, abnd 2056 ft.

Magnolia's Campbell Heirs 6, sw ne ne 7-1s-12w, abnd 2112 ft.

Texas Co.'s W. P. Steckler 6, ne ne sw 8-1s-12w, Penn 1494-1504 ft, 1506-21 ft, 12 bbls, 2036 ft.

Sohio's M. Kerwin 1-X, se sw ne 15-3s-14w, Biehl 1810-20 ft, 40 bbls, 1824 ft.

Sunflower O & G's Cogan 1, se ne nw 2-1n-12w, Biehl 1376-1410 ft, 30 bbls, 1410 ft.

Shell's L. G. Thrapp 2, sw se nw 29-1n-12w, McCl 2320-39 ft, 2373-74 ft, 2379-80 ft, 35 bbls, 2380 ft.

Wayne County: Bell Bros.' L. E. Borah 1, se ne sw 22-1s-8e, AV 3082-93 ft, 13 bbls, 3205 ft.

Texas Co.'s J. G. Boggs 9, ne se nw 17-3s-7e, abnd 3408 ft.

Pure's G. W. Best "A" 1, c se se 14-1n-8e, McCl 3103-17 ft, 3129-32 ft, 3171-74 ft, 3180-90 ft, 174 bbls, 3210 ft.

Pure's H. B. Mann 1, c nw nw 14-1n-8e, McCl 3071-78 ft, 37 bbls, 3180 ft.

White County: Sun's E. R. Greathouse 43, ne sw sw 33-4s-14w, Cyp 2586-2602 ft, Ben 2718-32 ft, 55 bbls, 2866 ft.

Carter Oil Co.'s Oscar Phillips 2, se ne nw 19-6s-9e, AV 2898-2920 ft, 2925-32 ft, TS 2294-2319 ft, 158 bbls, 2954 ft.

ILLINOIS WILDCATS
Week Ending January 8, 1944

Franklin County—Failure: Bell & Zoller Coal & Mining's Ziegler Coal & Coke 4, c nw sw 12-7s-1e, abnd 2806 ft.

Hamilton County—Failure: Biggs & Johnson's Barr 1, ne ne ne 26-4s-5e, abnd 3516 ft.

Jefferson County—Failure: Kiowa Drlg. Co.'s Smith-Webb Comm. 1, sw sw se 20-2s-4e, abnd 3176 ft.

Shelby County—Failure: Texas Co.'s A. Ferguson 1, nw sw ne 18-11n-6e, abnd 3550 ft.

INDIANA
Week Ending December 11, 1943

Posey County: Cherry & Kidd's Mumford 1, nw nw ne 33-3s-13w, abnd 2889 ft.

Jarvis & Marcell's Sanders 3, ne nw sw 26-6s-13w, abnd 2875 ft.

Warrick County: Frank Forrest, Tr.'s Wm. Walter 1, sw sw se 35-4s-6w, abnd 1187 ft.

INDIANA WILDCAT
Week Ending December 11, 1943

Madison County—Failure: A. W. Modent's W. F. Wilson 1, se se sw 16-21n-8e, abnd 1023 ft.

INDIANA
Week Ending December 18, 1943

Blackford County: Ray Mock's Fee 1, se ne ne 24-23n-11e, Trenton 927-57 ft, 10,000 gas, 957 ft.

Gibson County: Continental's F. A. Thrash 4, se ne sw 18-3s-13w, Walt 2060-92 ft, 44 bbls, 2798 ft.

K. D. Holland's O. Phillips 2, Don 98-1n-10w, abnd 1836 ft.

INDIANA WILDCAT
Week Ending December 18, 1943

Gibson County—Failure: Phillips' Pohs 1, ne ne nw 31-3s-10w, abnd 2285 ft.

INDIANA
Week Ending December 25, 1943

Daviess County: J. W. Cannon's F. X. Wilson 1, sw sw ne 17-2n-5w, abnd 680 ft.

Delaware County: W. E. Weidler's Linda Leeka 1, ne ne sw 13-20n-11e, abnd 1290 ft.

Gibson County: R. D. Brown's Martha Mahan 3, nw se sw 36-1s-10w, Hds 1341-54 ft, 15 bbls, 1354 ft.

Chester Oil Co.'s Shoultz 3, se se se 17-1s-9w, Hds 1278-89 ft, 26 bbls, 1289 ft.

Jay County: W. D. Farley's Carl A. Miller 1, c se se 26-23n-14e, abnd 1080 ft.

F. C. Weaver & S. Parker's A. W. Lewis 1, nw sw ne 12-24n-12e, Trent 1013-40 ft, 3 bbls, 1043 ft.

Spencer County: H. C. Dietrich's Axton 1, nw ne nw 30-7s-6w, Pal 882-87 ft, 2,784,000 gas, 887 ft.

INDIANA WILDCAT
Week Ending December 25, 1943

Posey County—Failure: J. B. Barnes' Spencer 1, se sw nw 14-8s-14w, abnd 2945 ft.

INDIANA
Week Ending January 1, 1944

Gibson County: Nat'l Consumers' Martin & Day 1, Don 94-1s-10w, McCl 1778-85 ft, 100 bbls, 1798 ft.

Superior's S. B. Thompson Unit 2, ne se nw 25-2s-12w, Cyp 1995-2006 ft, 107 bbls, 2009 ft.

J. E. Bauer et al's Virgil Phillips 1, Don 125-1n-10w, abnd 1834 ft.

Jay County: Muehlhausen & Smith's W. B. Hilficker 1, nw ne se 5-22n-15e, Trent 1054-95 ft, 100,000 gas, 1567 ft.

Posey County: Ral Mesel's J. W. Spencer 1, ne se 2-7s-14w, Walt 2017-24 ft, 16 bbls, 2024 ft.

INDIANA WILDCATS
Week Ending January 1, 1944

DuBois County—Failure: Ed S. Holeman's Ruth Rudolph 1, nw nw ne 24-1n-6w, abnd 992 ft.

Spencer County—Discovery: L. L. Benoist's C. A. Richards 1, se ne se 11-7s-7w, McCl 1540-46 ft, 4 bbls, 1548 ft.

INDIANA
Week Ending January 8, 1944

Daviess County: John Reinsel's F. X. Reinsel 4, sw ne ne 22-2n-6w, Paoli 745-47 ft, 250,000 gas, 747 ft.

Gibson County: Superior's Ellis Thompson 1, sw ne ne 25-2s-12w, Cyp 1978-91 ft, 161 bbls, 1991 ft.

Superior's C. W. Yeager Unit 1, nw se ne 25-2s-12w, Cyp 1964-76 ft, 115 bbls, 2293 ft.

Mo-Bu-Stro's B. Kennedy 3, se ne sw 35-2s-9w, Walt 1103-15 ft, 10 bbls, 1115 ft.

Continental's Bozeman Land Co. 66, se se se 23-3s-14w, Walt 2079-97 ft, 71 bbls, 2102 ft.

Nat'l. Consumers' Hugh Kirk 1, Don 114-1n-10w, McCl 1818-23 ft, 113 bbls, 1825 ft.

Posey County: H. P. Maier's Matilda Barter 1, nw nw se 30-6s-12w, abnd 1931 ft.

Carter Oil Co.'s Skiles 1, nw se ne 15-8s-15w, TS 2033-50 ft, AV 2654-70 ft, 142 bbls, 2805 ft.

INDIANA WILDCATS
Week Ending January 8, 1944

Gibson County—Failures: Superior's J. Hardiman 1, nw ne nw 7-2s-11w, abnd 2373 ft.

W. H. Bears' A. Thompson 1, ne sw sw 11-3s-12w, abnd 2624 ft.

Knox County—Failure: Gulf's Anna Halter 1, sw ne ne 13-2n-11w, abnd 1953 ft.

KANSAS
Week Ending January 8, 1944

Barber County—Sun City: Pryor & Lockhart's Massey 2, c sw nw 26-30s-15w, Simpson 4646 ft, td 4712, pb and abnd 2300 ft.

Barton County—Un-named: Texas Co.'s M. Peterman 3, c n½ sw se 33-17s-11w, Lans. 3329 ft, pump 238 bbls, 3329 ft.

Barton County — Kraft-Prusa: Black-Marshall's J. B. Hoffman 5, c nw sw 19-16s-11w, Basal Sd 3385 ft, fill ly 1200 ft oil in 50 minutes, 3391 ft.

Texon's J. G. Esfeld 3, ne ne sw 20-16s-11w, Arb 3323 ft, pump 528 bbls, 3328 ft

Black-Marshall's Paul Dolechek 3, c sw se 24-16s-12w, Arb 3366 ft, pump 85 bbls, 3372 ft.

Butler County—Potwin: Isador Malk's Pen-

ner 2, c w½ se sw 32-24s-4e, Miss 2737 ft, pump 75 bbls, 2739 ft.

Cowley County—Rahn: Ben Grallop et al's Ruth Rahn 3, sw sw se 14-34s-5e, Miss 3040 ft, abnd 3042 ft.

Ellis County—Bemis: Falcon-Seaboard's E. E. Craig 1, c sw sw 17-11s-16w, Simp 3334 ft, slight stain at 3342-45 ft, abnd 3370 ft.

Ellis County—Riverview: Phillips' Hand 2, se se sw 20-11s-18w, Arb 3661 ft, Lans 3273 ft, perf 500 gals acid, td 3665 ft, pb and abnd 3380 ft.

Ellis County—Koblitz: Carl Lebsack's Stackhouse 3, c n½ sw sw 23-12s-18w, Arb 3676 ft, 500 gals acid, pump 360 bbls, 3681 ft.

Ellis County—Leiker: Phillips' Wassinger 1, c ne ne 15-15s-18w, Arb 3578 ft, pump 66 bbls oil, 4 bbls wtr, 3583 ft.

Graham County — SE Morel: Bridgeport's Teal 1, nw ne sw 25-9s-21w, Arb 3823 ft, abnd 3828 ft.

Greenwood County—Gilroy: Becker & Stewart's Grace Pussey 1, sw sw se 31-24s-13e, Miss 1534 ft, abnd 1563 ft.

Kearny County—Hugoton: Finker's McKay-Willis 1, c 34-24s-35w, Ft. Riley prod, 22,000 gals acid, 21,871,000 gas, 2679 ft.

Leavenworth County — Jarbalo: Sherrod & Apperson's Metropolitan Life 1, c w½ nw sw 9-10s-21e, McLouth Sd 1274 ft, 5,900,000 gas, 1286 ft.

Marion County—Lost Springs: Bob Youker's McNichol 4, nw se nw 3-17s-4e, Miss 2297 ft, pay 2331-36 ft, pump 300 bbls, 2352 ft.

McPherson County—South Roxbury: Westgate-Greenland's Tinkler 1, c sw nw 29-17s-1w, Miss 2691 ft, abnd 2721 ft.

McPherson County—N. Canton: W. C McBride's J. W. Koehn 1, c n½ ne sw 36-18s-1w, Miss 2817 ft, abnd 2870 ft.

Pratt County—Cunningham: Transwestern's Sellens 1, c e½ ne sw 3-28s-11w, Lans 3504 ft, perf 500 gals acid, pump 208 bbls oil, 3% wtr, 4155 ft.

Reno County—Zenith: Stanolind's Ira C. Johnson 3, c s½ ne se 31-23s-10w, Viola 3685 ft, 3000 gals acid, flow 125 bbls in 1½ hrs, 3721 ft.

Shell's Paine 4, sw se nw 5-24s-10w, Viola 3748 ft, 500 gals acid, flow 356 bbls, 3788 ft.

Reno County—N. Hilger: Phillips Pet.'s Ena 1, sw sw sw 27-25s-4w, Viola 4104 ft, 50 gals acid, abnd 4135 ft.

Reno County—Laredo: Shell's Lee 2, se se se 10-26s-9w, Arb 4322 ft, abnd 4333 ft.

Rice County—Smyres: A. R. Jones et al's Geo. Smyres 1, ne ne ne 35-19s-6w, Miss Chat 3270 ft, abnd 3345 ft.

Rice County—Chase: Aylward's Link 1, se sw 17-19s-9w, White Lans 2905 ft, perf, 100 gals acid, pump 75 bbls, 3268 ft.

Rice County — Silica: Nadel & Gussman's Bayer 1, ne ne sw 29-19s-10w, Cherty cong 3279 ft, 1000 gals acid, pump 2 bbls per hr for 9 hrs, 3286½ ft

Rice County—Keisling: Cities Service's Coldwater "B" 5, c e½ se nw 17-20s-9w, Solid Arb 3285 ft, 300 gals acid, pump 400 bbls, 3293 ft.

Rice County—Raymond: Hyde & Stormfeldt's Warner 2, c se nw 15-20s-10w, White Lans 3089 ft, 6000 gals acid, ball 3 bbls per hr, 3186 ft.

Rooks County—Stockton: Consumers Coop. & Allen's Kelley 2, c sw nw 35-7s-17w, Lans 3064 ft, perf, td 3156 ft, pb and abnd 3030 ft.

Rooks County—Barry: N. Appleman's Slansky 1, sw se sw 35-8s-19w, Arb 3422 ft, fill up 350 ft oil, swabbed down, and swabbed water, abnd 3432 ft.

Russell County—Vaughn: Gulf's Reinhardt 3, c nw se 19-14s-14w, Arb 3263 ft, 1000 gals acid, pump 66 bbls oil ss wtr, 3272 ft.

Russell County—Rusch: Stearns & Vernon's Olson "B" 3, sw sw ne 28-14s-14w, Solid Arb 3278 ft, abnd 3280 ft.

Russell County — Driscoll: Billings and Haynes' Driscoll 1, c w½ ne nw 31-15s-11w, Arb 3273 ft, 500 gals acid, pump 400 bbls, 3290 ft.

Russell County—Greenvale: Jones & Shelbourne's Vejl 2, c s½ nw sw 5-15s-12w, Arb 3299 ft, pump 117 bbls oil, 7 bbls wtr, 3310 ft.

Russell County — Forrest Hill: Shell's E. Klusener 1, nw sw se 28-15s-12w, Arb 3229 ft, 500 gals acid, swab 237 bbls in 4 hrs, 3246 ft.

Russell County—Trapp: Shields et al's Gross "C" 1, c ne se 5-15s-13w, KC 2967 ft, 5000 gals acid, pump 317 bbls, 3020 ft.

Stafford County—Gates: Phillips' Schwartz 1, c nw nw 27-21s-13w, Arb 3721 ft, dead oil, abnd 3750 ft.

Stafford County—Riley: Great Lakes Carbon's Wendelburg 2, ne ne se 29-23s-11w, Cherty Viola 3662 ft, abnd 3680 ft.

Great Lakes Carbon's Volker 1, ne ne ne 32-23s-11w, Lans 3325 ft, 1000 gals acid, pump 24 bbls oil, 24 bbls wtr, 3466 ft.

KANSAS WELLS DEEPENED

Week Ending January 1, 1944

Ellis County—Bemis: British American's Bemis 6, se nw sw 22-11s-17w, Input swd, Granite Wash 3967 ft, Input test, 105 bbls wtr per hr, otd 3430 ft, td 3967 ft

Kingman County — Cunningham: Skelly's Leisman 6, nw nw nw 29-27s-10w, White Lans 3346 ft, 2000 gals acid, pump 60 bbls oil, 40 bbls wtr in 12 hrs, otd 2150 ft, td 3433 ft.

KANSAS WILDCATS

Week Ending January 1, 1944

Barber County — Failure: Phillips' Davis Ranch 1, nw nw nw 3-35s-15w, Lans 4231 ft, Miss 4900 ft, Kinderhook 5020 ft, Chatanooga 5285 ft, Misener sd 5326 ft, Cherty Viola 5332 ft, Crystalline Viola 5499 ft, Simp sh 5517 ft, Simp dol 5533 ft, Simp sd 5542 ft, sso 5573 ft, Arb 5700 ft, pors and nw, Base Simp sd 5575 ft, abnd 5743 ft

Barton County—Failure: Zephyr Drlg. Co.'s Kaster 1, ne ne sw 10-16s-14w, Lans KC 3158 ft, Base KC 3345 ft, Cherty cong 3351 ft, Arb 3362 ft, abnd 3402 ft.

Barton County—Discovery: Cities Service's Eveligh 1, ne se 11-18s-14w, chert 3312-16 ft, perf 3300-06, 3305-09 ft, 750 ft oil in 23 mins, perf 3306-10 ft, 1637 ft oil in 45 mins, 2840 ft in 3 hrs, cong 3294 ft, Schist 3311 ft, pump 217 bbls in 13 hrs, 60-gr, 3337 ft.

Graham County—Failure: Davis-Childs Motor Co.'s Scott 1, ne ne nw 7-7s-22w, Anhy 1965 ft, Topeka 3360 ft, Heebener 3568 ft, Lans 3593 ft, Arb 3946 ft, abnd 4000 ft.

Jefferson County—Failure: Dan McLaughlin's J. Heibsch 1, c ne nw 17-9s-19e, Sd 1678 ft, 1685 ft, Miss 1712 ft, wtr 1815 ft, abnd 1935 ft.

Kingman County—Failures: Derby Oil's El Comanche, c se nw 8-28s-8w, Base Kc 3820 ft, Base Miss 4085 ft, sso 3661-65 ft, Viola 4276 ft, Simp Sd 4328 ft, Arb 4440 ft, abnd 4470 ft.

Herndon & Danneberg's J. M. McKena 1, c nw se 34-28s-9w, Miss 4194 ft, Kinderhook 4303 ft, Viola 4501 ft, Simp 4574 ft. Arb 4685 ft, abnd 4710 ft.

Pottawatomie County—Failure: C. O. LaSielle's Unschied 1, c nw nw 16-9s-9e, sso 1689-92, 1958-60, 1983-93 ft, St. Peter 2002 ft, Topeka 460 ft, Oread 660 ft, Base Oread 730 ft, Lans 850 ft, Base Hertha 1150 ft, Hunton 1292 ft, Maquoketa 1744 ft, Viola 1828 ft, Simp 1944 ft, Simp 1962 ft, Arb 1984 ft, sso 1983-93 ft, Red Combian Sd 2065 ft, abnd 2075 ft.

Rooks County—Failures: Bridgeport Oil's Matheson 1, c se sw 6-8s-20w, Heebener 3165 ft, Toronto 3186 ft, Base Oread 3200 ft, Lans 3206 ft, 3389-97 ft, Base KC 3420 ft, Cong 3453 ft, Sat'n sd 3458-62 ft, Arb 3470 ft, abnd 3512 ft.

Nadel & Gussman et al's Powell 1, se sw se 36-9s-20w, Arb 3829 ft, Simp 3812 ft, abnd 3851 ft

Russell County—Failures: Phil-Han et al's Baetty 1, se sw sw 9-12s-13w, cong 3295 ft, hfw 3314-16 ft, Viola 3410 ft, Simp 3447 ft, Arb 3508-15 ft, hfw, abnd 3815 ft.

J. M. Huber & Bay Pet.'s Holland 1, nw ne sw 31-13s-13w, sso 3324-30 ft, Lans 3021 ft, cong 3322½ ft, Arb 3367½ ft, abnd 3377 ft.

Stafford County—Discovery: W. N. Bartlett's Kisner 1, c e½ se ne 3-22s-13w, sso 3417-21 ft, Rwk Arb 3698 ft, solid Arb 3704 ft, perf 3704-08 ft, 500 gals acid, pump 70 bbls oil, 10 bbls wtr, 3752 ft.

Stafford County—Failure: Skelly's H. W. Landreth 1, se se ne 33-24s-14w, abnd 770 ft.

KANSAS

Week Ending January 8, 1944

Barton County—Feltes: Winkler-Koch's F. Gill 1, c ne ne 11-16s-12w, Granite 3472 ft, ns, abnd 3480 ft.

Barton County—Odin: Bay Pet. & Auto Ordnance's Prosser 1, ne ne se 33-16s-12w, Arb 3377 ft, ns, abnd 3402 ft.

Barton County—Boyd: Darley Pet.'s Murdy (Boyle) 1, se se se 33-17s-14w, Arb 3417½ ft, abnd 3473½ ft.

Cowley County—Bruce: Phillips' Bruce 2, nw ne ne 9-30s-4e, Arb 3366 ft, ns, abnd 3396 ft.

Dickinson County—Lost Springs: R. E. Youker's Martin 2, nw sw se 34-16s-4e, Miss Chat 2262 ft, pay 2285-2300 ft, pump 150 bbls, 2330 ft.

Ellis County—Riverview: N. Appleman & Sohio's Jensen 1, se nw sw 30-11s-18w, Lans 3215 ft, vsso at 3457-65 ft, abnd 3593 ft.

Graham County—Morel: Continental-Cities Service's Loveridge 3, se sw se 10-9s-21w, Arb 3701 ft, 2000 gals acid, pump 97 bbls, td 3790 ft, pb 3728 ft.

Graham County—SE Morel: Gulf's Hinman 2, nw nw se 23-9s-21w, Arb 3791 ft, 2000 gals acid, swab 104 bbls in 6 hrs, 3807 ft.

Bridgeport's Fessler "A" 4, nw se nw 25-9s-21w, Arb 3766-69 ft, 100 gals acid, fill 200 ft heavy black oil, 2400 ft wtr, abnd 3787 ft.

Greenwood County—Virgil: Aikman & Braden's Coffman Est. 2, c ne ne 10-24s-12e, Miss 1801 ft, hfw, abnd 1838 ft.

Harvey County—Burton: Nat'l Assoc. Pet.'s Huliman 1, c nw ne 20-23s-3w, Lans 2530 ft, perf, 1000 gas, pump 5 bbls oil, 3377 ft.

Pratt County—N. Stark: Lauck & Moncrief's Claycombe 1, ne se ne 12-26s-12w, Viola 4125-38 ft, pump 3 bbls oil per hr, 22% wtr, td 4141 ft, pb 4140 ft.

Pratt County—N. Tuka: Skelly's Helmke "D" 2 c se sw 25-26s-13w, Arb 4321-29 ft, 1500 gals acid, flow 284 bbls in 10 hrs, 4329 ft.

Rice County—Volkland: Phillips' Volk 2, ne se sw 27-18s-9w, Arb 3246 ft, pump 322 bbls, 3254 ft.

Rice County — Chase: Magnolia's C. O. Sharpe 3, c se nw 8-20s-9w, Arb 3258-63 ft, pump 26 bbls, 3266 ft.

Rice County—Silica: Beardmore's Wenke 3, c nw se 7-20s-10w, cong 3390 ft, abnd 3415 ft.

Russell County—Williamson, SE: Hartman & Blair's Sam Boxberger 2, sw nw se 10-14s-14w, Lans 2993 ft, 6000 gals acid, pump 446 bbls in 30 hrs, 3024 ft.

Russell County—Vaughn: Phillips' Brandenberg 2, c sw ne 30-14s-14w, Arb 3217 ft, vsso at 3223-27 ft, abnd 3227 ft.

Russell County—Driscoll: Stanolind's Harry Chegwidden 1, c w½ se nw 30-15s-11w, Lans 2986 ft, Arb 3301 ft, 2000 gals acid, td 3330 ft, pb and abnd 3032 ft.

Saline County—Hunter: Deep Rock's J. W. Van Meter 2, ne sw se 20-16s-1w, Miss 2628 ft, pump 189 bbls oil, 9 wtr, 2631 ft.

Stafford County—Max: Shell et al's Wolf 1, c w½ nw nw 7-22s-11w, Arb 3646 ft, ns, abnd 3676 ft.

Trego County—Ellis: Bridgeport's Gugler 2, c w½ ne se 36-12s-21w, Arb 3874 ft, pump 115 bbls oil, 5 wtr, 3902 ft.

KANSAS WILDCATS

Week Ending January 8, 1944

Barton County—Discovery: Phillips' Brade 1, se se nw 29-16s-14w, sso 3464-68 ft, shot 10 qts 3472-79 ft, pump 10.53 bbls oil, 60% wtr, 3481 ft.

Barton County—Failure: Phil-Han's Ludwig 1, ne ne sw 36-20s-13w, sso 3517 ft, ¼ bbl 3514-17 ft, sd, 100 ft oil, 150 ft wtr, abnd 3552 ft.

Butler County—Failure: Masa & Wixon's Edmondson 1, se sw 32-25s-4e, Miss 2495-2650 ft, abnd 2750 ft.

Marion County—Failures: N. Appleman et al's Garrett 1, ne sw 29-18s-1e, Miss 2822 ft, abnd 2860 ft.

Weber Dental Mfg. Co.'s Evans 2, nw nw sw 34-20s-8w, Lans 2900 ft, Base KC 3210 ft, cong 3270 ft, Misener 3374-76½ ft, abnd 3387 ft.

Ottawa County—Failure: Stanolind's Katherine Murphy Duggan 1, nw sw 12-12s-1w, Base Florence Flint 505 ft, Howard 1442 ft, Topeka 1510 ft, Heebner 1760 ft, Lans 1905 ft, Base KC 2265 ft, Burgess Sd 2548 ft, Miss 2550 ft, Kinderhook 2710 ft, Hunton 2900 ft, Sylvan 3015 ft, Viola 1368 ft, Simp 3276 ft, Arb 3360 ft, abnd 3401 ft.

Reno County—Failure: Continental's J. A. Dunn 1, sw sw ne 4-24s-8w, KC 3245 ft, Miss chat 3741 ft, Miss lime 3809-19 ft, abnd 3833 ft.

Rooks County—Failure: Lotus Oil's Young 1, sw sw sw 25-8s-19w, Anhy 1445-85 ft, Lans 3220 ft, Topeka 2995 ft, poor pors and stail 3321-24 ft, cong 3492 ft, Arb 3538-70 ft, sso 3408-11 ft, abnd 3570 ft.

Rush County—Failure: Falcon-Seaboard & Eldorado's Wilson 1, se se sw 36-17s-19w, KC 3505 ft, Base KC 3785 ft, cherty lime 3828 ft, cherty cong 3890 ft, abnd 3953 ft.

Stafford County—Failures: Shell et al's Wolf 1, nw nw nw 7-22s-11w, Topeka 2776 ft, Arb 3646 ft, abnd 3676 ft.

Great Lakes Carbon's Koelsch 1, ne sw ne 23-24s-14w, Arb 4198 ft, good pors 4230 ft, Anhy 810 ft, Lans 3620 ft, cong 3975 ft, Viola 3997 ft, Simp 4155 ft, abnd 4230 ft.

KENTUCKY

Week Ending December 11, 1943

Butler County: Craven et al's V. Harrison 1, 8-H-32, abnd 425 ft.

Perry Fulk's Avery Jenkins 1, (2) 13-H-32, abnd 471 ft.

Henderson County: Farm Bureau's Burbank 11-A 3-P-21, Cyp 2311-18 ft, 434 bbls, 2318 ft.

Carter Oil Co.'s Culver Oil & Mineral 1, 24-P-21, Walt 1751-55 ft, 111 bbls, 1755 ft.

Farmer & Chenault's Glenmore Dist 2, 19-Q-26, McCl 2021-29 ft, 10 bbls, 2029 ft.

Union County: Sun Oil Co.'s W Morgan 3, 20-P-19, Walt 1787-96 ft, 100 bbls, 1796 ft.

KENTUCKY WILDCATS

Week Ending December 11, 1943

Daviess County — Failure: Ohio & Basin Drlg. Co.'s St. Raphael's Church 1, 15-O-28, abnd 2126 ft.

Henderson County—Discovery: Wood & Dorsey's Bauldauf 1, 15-Q-22, TS 1869-78 ft, 10 bbls, 2317 ft.

Webster County — Failure: Potter-Conley's T. T. Link 1, 25-M-25, abnd 1315 ft.

KENTUCKY

Week Ending December 18, 1943

Daviess County: Miller & Shiarella's Miller Coames Comm. 2, 11-N-27, abnd 2083 ft.

Henderson County: Wood & Dorsey's Bauldauf 2, 16-Q-22, TS 1868-69 ft, 220 bbls, 1869 ft.

Muhlenberg County: R. A. Cullinan & Son's P. Cook 1, 21-H-31, Hds 429-52 ft, 10 bbls, 452 ft.

Union County: Carter Oil Co.'s Culver Oil & Mineral 2, 4-O-21, McCl 2584-89 ft, 36 bbls, 2595 ft.

Hiawatha's City of Uniontown 5, 19-P-19, Walt 1729-43 ft, 50 bbls, 1743 ft.

Webster County: Shamrock Oil Co.'s Clarck 3, 23-M-21, abnd 1375 ft.

Cherry & Kidd's Mrs. Heft 2, 14-N-24, TS 1853-56 ft, 110 bbls, 2226 ft.

J. R. Powell's Carrie Tapp 2, 14-N-24, abnd 2216 ft.

KENTUCKY

Week Ending December 25, 1943

Daviess County: Mar-Hill et al's Sargent 3, 11-N-28, abnd 1697 ft.

Hancock County: S. Zanetis et al's Fred Morris 1, 1-O-33, abnd 611 ft.

Henderson County: Carter Oil Co.'s Culver Oil & Mineral 3, 24-P-21, McCl 2554-59 ft, 100 bbls, 2559 ft.

Union County: Ashland-Basin & Evans' Johnston 1, 13-O-18, AV 2743-66 ft, 104 bbls, 2768 ft.

Trans Tex & Ashland's C. T. Newman 3, 13-O-19, abnd 1460 ft.

Carter Oil Co.'s Kate Austin 2, 1-O-20, O'H 2500-02 ft, McCl 2532-37 ft, 32 bbls, 2542 ft.

Sohio Prod. Co.'s Roberts 1, 3-O-20, abnd 2760 ft.

KENTUCKY WILDCATS
Week Ending December 25, 1943

Allatin County—Failure: Gulf's H. Christman 1, 15-V-74, abnd 810 ft.

Breckinridge County—Failure: Shell's Quiggins 1, 2-N-39, abnd 1550 ft.

Christian County—Failure: Hobson & Holeman's J. T. West 1, 1-F-26, abnd 2800 ft.

Daviess County—Failure: Vickers & Slaughter's V. R. Consler 1, 11-N-29, abnd 1510 ft.

KENTUCKY
Week Ending January 1, 1944

Butler County: Butler County Oil Co.'s Ora Brown Heirs 4, 9-H-32, TS 376-96 ft, Hds 506-27 ft, 40 bbls, 527 ft.

I. B. Green's Ed Sumner 2, 13-H-32, Hds 358-65 ft, 6 bbls, 366 ft.

Henderson County: Sohio's Forrest Cates 1, 21-P-22, abnd 2739 ft.

Sun's Julius Fohs 1, 24-Q-22, abnd 2673 ft.

McLean County: Kingwood Oil Co.'s C. Plain 1, 17-L-28, abnd 2005 ft.

Union County: Hiawatha's City of Uniontown 6, 19-P-19, Cyp 2184-2207 ft, 290 bbls, 2213 ft.

Webster County: Texas Co.'s J. Graham 1, 23-M-21, abnd 3066 ft.

KENTUCKY WILDCATS
Week Ending January 1, 1944

Butler County—Failure: L. L. Dougherty's Carl Hunt 1, 7-H-32, abnd 505 ft.

Daviess County—Failure: Harry Faber's W. W. Probes 1, 19-O-32, abnd 840 ft.

Hopkins County—Failure: Sohio's J. H. Williams 1, 25-M-25, abnd 3209 ft.

Webster County—Failure: Texas Co.'s Littlepage 1, 6-L-22, abnd 1402 ft.

KENTUCKY
Week Ending January 8, 1944

Daviess County: Reilley & Barnett's Turley & Tong 1, 10-N-29, abnd 1666 ft.

Henderson County: P. O. Wall's Cabell 2, 23-Q-21, abnd 2321 ft.

Woods & Dorsey's Bauldauf 3, 16-Q-22, TS 1852-64½ ft, 165 bbls, 1864½ ft.

Muhlenberg County: R. A. Cullinan & Son's P. Cook 2, 31-H-31, Hds 415-39 ft, 10 bbls, 439 ft.

Ohio County: Wellis Massie's C. O. Martin 4, 3-M-31, TS 730-43 ft, 770-83 ft, 15 bbls, 783 ft.

Thrasher & Helm's Anna Overby 1, 17-N-32, TS 614-33 ft, 10 bbls, 638 ft.

NORTH LOUISIANA
Claiborne Parish — Haynesville: Midstates Oil Corp.'s Williamson-Hearn 1, 28-23n-8w, perf 5469-89 ft, 8000 gals acid, flow 500 bbls 40.2-gr. 520/1, td 5557 ft.

Lincoln Parish: Arkansas-Louisiana Gas Co.'s Liner Unit 1, ne se 36-19n-3w, dr for gas to Travis Peak.

Union Parish—Monroe Gas Field: Interstate Nat'l's Fee 129, 24-21n-3s, 5,332,000 gas, td 2189 ft.

NORTH LOUISIANA WILDCATS
Caddo Parish—Failure: Ohio Oil Co.'s Williams 1, 2010e 755s of nw cor 3-22n-15w, Pettit 5808 ft, abnd 5935 ft.

Morehouse — Failure: Texas Co.'s Louisville Coop 1, 6-22n-9e, abnd 5427 ft.

SOUTH LOUISIANA
Beauregard Parish—Fields: Sohio Production Co.'s Lutcher-Moore 2, start ne cor sec 3 go 1980 ft s alg el sec 4, th n 89° 45 mins w for 1980 ft to lcn 4-7s-12w, abnd 8107 ft.

St. Mary Parish—Bayou Sale: Atlantic's St. Mary Parish Land 1-B, 3210 ft e 597 ft s of nw cor 2-17s-9e, 5½-in 10,168 ft, perf 9576-90 ft, 100 bbls, ¼-in, td 10,170 ft.

SOUTH LOUISIANA WILDCAT
Calcasieu Parish—Failure: Union Sulphur's Stark & Brown 2, Gum Cove area, 35-11s-12w, abnd 9100 ft.

MISSISSIPPI WILDCATS
Humphreys County—Failure: Greggtex Gasoline Co.'s Box 1, c nw se 24-14n-4w, abnd 5503 ft.

Yazoo County—Failure: Northern Ordnance's Koppers 1, se sw 6-13n-2w, abnd 6200 ft.

Jefferson Davis County—Failure: Freeport Sulphur Co.'s Frontenberry 1, sw 32-6n-19w, abnd 1895 ft.

MICHIGAN
Allegan County—Fillmore: Michigan Devonian and Langs' Boeve 1, sw sw nw 12-4n-15w, Traverse, pump 35 bbls, td 1524 ft.

Newaygo County—Goodwell: Pure's Madison 1, e½ ne sw 5-14n-11w, Traverse, flow 76 bbls, td 2823 ft.

Pure's Winkler 1, e½ nw nw 9-14n-11w, Traverse, flow 30 bbls, td 3562 ft, pb 2838 ft.

Osceola County—Rose Lake: Sun's Knapp 1, s½ nw nw 6-18n-9w, Traverse, flow 96 bbls, td 3172 ft.

C. L. Maguire's Johnson 1, s½ sw se 36-19n-10w, Traverse, flow 128 bbls, td 3150 ft.

Van Buren County — New Geneva: Louis Rose's Abbott 2, ne sw se 23-1s-16w, Traverse dry, td 1034 ft.

Gladwin County — West Beaverton: Sun's State B1, e½ ne nw 30-18n-2w, Dundee dry, td 4067 ft.

MICHIGAN WILDCATS
Allegan County — Failure: Fisher-McCall's Baker 1, sw sw se 27-4n-11w, Traverse, td 1361 ft.

Huron County—Failure: C. W. Teater's Todd 1, w½ nw ne, 5-16n-13e, Berea 1320 ft, td 1350 ft.

NEW MEXICO
Lea County — Eunice: Continental et al's Meyer 1-A-29, c sw se 29-22s-36e elev 3519 ft, base salt 2960 ft, Yates 3130 ft, 4,630,000 dry gas from perf, td 3717 ft, pb 3450 ft.

OKLAHOMA
Week Ending January 1, 1944

Caddo County—Cement: Ohio's Kal-da-ing 3, ne nw nw 10-5n-9w, sand 6263-6356 ft, cong 6356-6513 ft flow 624 bbls, 6579 ft.

Carter County—Healdton: Magnolia's Smalley 1, c sw ne 10-4s-3w, sand 1029-41 ft, pump 5 bbls, td 1104 ft, pb 1073 ft.

Creek County—SE Stroud: J. E. Crosbie's Elle 3, se ne ne 17-14n-7e, Prue 2836 ft, shot 240 qts, flow 100 bbls, 2912 ft.

Creek County—Cushing: Sinclair Prairie's Litchfield 45, ne sw nw 22-17n-7e, Bart 2771 ft, shot 80 qts, pump 58 bbls, 2855 ft.

Creek County—Glenn: Sinclair Prairie's L. L. Berryhill 53, nw ne se 16-17n-12e, Glenn 1413 ft, shot 140 qts, pump 7 bbls, 1589 ft

Garfield County—Garber: Sinclair Prairie's Hartley 57, c ne nw 18-22n-3w, Sand 1552 ft, pump 43 bbls, 1575 ft.

Garvin County—Pauls Valley: Cities Service's Tipton 1, c nw ne ne 6-3n-1e, Penn Prod, Sd 3962-73 ft, 4042-49 ft, 4098-4104 ft, shot 10 qts, pump 22 bbls oil, 2 bbls wtr, 4226 ft.

Phillips' Mauldin 2, se se se 31-4n-1e, Viola 4229 ft, abnd 4311 ft.

Cities Service's Jacobs 1, nw sw sw 32-4n-1e, Penn Sd 4245 ft, 6.3-gr, 4000 gas, flow 40 bbls in 8 hrs, 4325 ft.

Pure-Continental's Bedal-Collins 2, se nw sw 25-4n-1w, Penn Sd 3936-76 ft, Bromide 4012 ft, dual prod at 3988 ft, Penn flow 275 bbls oil, 260,000 gas, Bromide flow 2957 bbls oil, 2,989,000 gas, 4067 ft.

Mid-Continent's Campbell 2, c nw se ne 36-4n-1w, Penn sd 3340-48 ft, 3820-28 ft, 2000 gas, td 4113 ft, pb 3925 ft.

Okmulgee County—Bald Hill: Peterson's Asbury 5, nw sw se 8-15n-14e, Sd 1801-69 ft, abnd 1892 ft.

Osage County—Hickory Creek: Blackwell's No. 5, sw nw sw 10-28n-11e, Sd 1004-17 ft, shot 20 qts, swab 8 bbls, 1017 ft.

Sagamore's No. 421, se sw se 32-29n-12e, Miss 1731 ft, 1,500,000 gas, 1745 ft.

Pottawatomie County—Wanette: W. A. Delaney's Tundis 1, c sw sw 17-6n-3e, Layton 3220 ft, abnd 3232 ft.

Pottawatomie County—St. Louis: Commercial's McCully 4, sw sw se 6-7n-4e, owpb, otd 3977 ft, Thurman 3839-54 ft, shot 60 qts, abnd 3865 ft.

Pure's Thomas 4, se ne ne 26-7n-4e, owpb, otd 4246 ft, Calvin 3012-25 ft, pb and abnd 3660 ft.

Seminole County—Rusk: Malernee's Wheeler 1, nw se sw 7-11n-8e, Cromwell 3662 ft, pump 56 bbls, 3675 ft.

Stephens County—W. Duncan: T. H. McCasland's Revis 1, sw nw se 24-1s-9w, Sd 2080-83 ft, flow 50 bbls, td 2624 ft, pb 2108 ft.

Stephens County—Loco: Charles Scott's Wilson 19, se nw nw 9-3s-5w, Sd 190-204 ft, 782-90 ft, Lime 810-30 ft, 860-90 ft, 968-991 ft, 1078-90 ft, 3000 gals acid, pump 8 bbls, 1133 ft.

OKLAHOMA WELL DEEPENED
Creek County—Glenn: Sinclair Prairie's J. F. Berryhill 14, nw ne ne 16-17n-12e, Glenn 1566-81 ft, shot 15 qts, pump 5 bbls, otd 1565 ft, td 1581 ft.

OKLAHOMA WILDCATS
Week Ending January 1, 1944

Lincoln County—Failure: Fain-Porter's McVicker 1, ne ne sw 8-15n-5e, Cd 4403-13 ft, 2 Wx 4431 ft, abnd 4452 ft.

Noble County—Failure: Big Chief et al's Green 1, ne ne se 19-20n-1w, Sch. Wdf. 4952 ft, Mn 5002 ft, Sylvan 5006 ft, Viola 5046 ft, Dense 5090 ft, Wx 5142 ft, abnd 5150 ft.

Pontotoc County — Discovery: Patsy Oil's Norris 1, c s½ ne ne 25-2n-7e, perf in Hunton, 4570-80 ft, pb 4560 ft, 1500 gas, comp gas well 4560 ft.

Pottawatomie County—Failure: Deep Rock's Forsee 1, sw sw se 11-11n-3e, 2 Wx 5779 ft, Cd 5668-71 ft, perf in Misener and Hunton, abnd 5506 ft.

Seminole County—Failure: Varco Oil Co.'s Harjo 1, sw se 24-6n-6e, abnd 1640 ft.

Tillman County — Failure: Jack Martin's Riverbed 1, se nw sw 13-5s-15w, top Burkburnett 1912 ft, abnd 1950 ft.

OKLAHOMA
Week Ending January 8, 1944

Caddo County—Cement: Amerada's Hartshorne 1, ne se ne 2-5n-10w, Medrano 6019-6153 ft, flow 1336 bbls oil, 531,000 gas, 6128 ft.

Creek County—S. E. Stroud: F. C. Hall's McCammon 1, se se sw 5-14n-7e, Prue 2932 ft, Verdigris 2964 ft, shot 210 qts, abnd 2969 ft.

Creek County—Glenn: Gulf's Anderson 33, nw sw nw 9-17n-12e, Glenn Sd 1766 ft, pump 14 bbls oil, 5 wtr in 9 hrs and pumped off, 1770 ft.

Gulf's Clayton 36, nw ne nw 9-17n-12e, input well, Glenn Sd 1550 ft, 1718 ft.

Garvin County—Pauls Valley: Pure's Cashin-Teter 2, nw sw ne 31-4n-1e, Penn Sd 3889 ft, flow 485 bbls oil, 2,115,000 gas, 4050 ft.

Pure's Teter 12, nw nw sw 31-4n-1e, Bromide 3868 ft, top sd 4002 ft, flow 1231 bbls oil, 1,570,000 gas, 4075 ft.

Kay County — Vernon: Kan-O-Tex Ref.'s Sherbon 1, ne ne sw 20-29n-1e, Miss 3316 ft, pump 32 bbls, 3362 ft.

Lincoln County — Chandler: Great Lakes Carbon's Chase 1, nw sw ne 3-14n-3e, Bart 4399 ft, shot 40 qts, pump 100 bbls oil, 20 wtr, 4414 ft.

Lincoln County—E. Sporn: T. N. Berry's Anderson 1, sw nw sw 23-17n-3e, Wx 4534 ft, abnd 4577 ft.

Logan County—Crescent: Davon's Nave 1, c se sw 22-17n-4w, Layton 4950 ft, flow 48 bbls, 4984 ft.

Logan County—Lovell: Bahan's Blaney 1, c se sw 21-18n-4w, Hoover 3440-55 ft, flow 18,000 gas, 10 bbls distillate, 3505 ft.

Champlin's Kendrick 1, sw nw ne 21-18n-4w, Hoover zone 3437 ft, 9,800,000 gas 3454 ft.

Marshall County—Isom Springs: Dennison Oil Co.'s Adams 2, se ne ne 6-8s-6e, Sd 540-55 ft, pump 10 bbls, 565 ft.

Okfuskee County — NE Dill: Blackwell's Seran 2, nw sw nw 19-12n-9e, Cromwell 3499 ft, shot 10 qts, pump 10 bbls, 3517 ft.

Osage County—Avant: Barnsdall's No. 14, sw ne sw 14-23n-11e, Bart 1652 ft, shot 160 qts, pump 15 bbls, 1691 ft.

Osage County—Hickory Creek: Ross O & G's No. 15, sw ne se 15-29n-11e, swd, shot 40 qts, 711 ft.

Pontotoc County—W. Fitts: Roodhouse-Phillips' Hunter 2, c n½ nw se 28-2n-6e, Penn Caney 3333 ft, abnd 3370 ft.

Pontotoc County—Allen: W. A. Delaney's Watson Wheeler 1, sw sw sw 16-5n-8e, Booch 2181 ft, shot 60 qts, pump 14 bbls, td 4303 ft, pb 2200 ft.

Pottawatomie County — St. Louis: Smith Bros.' Green 1, c nw se 4-6n-5e, Viola 3928 ft, 2 Wx 4211 ft, perf, td 4242 ft, pb & abnd 4030 ft.

H. C. Schafer's Groves 1A, c ne ne 5-6n-5e, Sd 3178-85 ft, abnd 3212 ft.

Seminole County—Bowlegs: Sinclair Prairie's Miskovsky 1, se ne nw 28-8n-6e, Wx 4367-68 ft, 2 Wx 4476 ft, abnd 4498 ft.

Seminole County—Cromwell: Northern Ordnance's Gunn 1, se sw ne 29-11n-8e, Cromwell 3550-57 ft, abnd 3748 ft.

Sequoyah County—Gans Gas Field: Western Okla.'s Nix 2, ne nw se 1-10n-24e, Hunton 3912 ft, abnd 4029 ft.

Stephens County—Velma: Phillips' Quinn 1A, sw se se 23-1s-5w, Penn 1190 ft, Sd 1425-32 ft, shot 60 qts, pump 72 bbls, td 1590 ft, pb 1486 ft.

Stephens County—W. Duncan: T. H. McCasland's Armstrong 1, sw sw se 24-1s-9w, Sd 2531-37 ft, pump & flow 115 bbls, 2563 ft.

T. H. McCasland's Brooks 1, ne ne nw 25-1s-9w, abnd 2652 ft.

OKLAHOMA WELL DEEPENED
Week Ending January 8, 1944

J. P. Flanagan's E. Farris 4, se ne se 36-17n-8e, Sandy lime 3109 ft, otd 2792 ft, abnd 3112 ft.

OKLAHOMA WILDCATS
Week Ending January 8, 1944

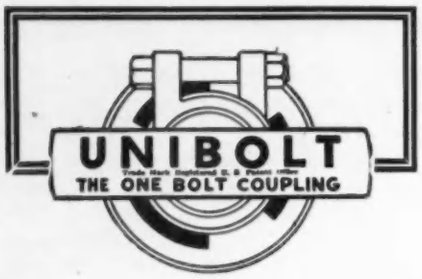
Hughes County—Discovery: Otha H. Grimes' Haney 1, ne ne ne 1-8n-10e, Gilc Sd 2839 ft, 7-in at 2840 ft, 8,500,000 gas, 2856 ft.

Hughes County—Failure: Sunray Oil's Baxter 1, ne sw nw 12-8n-9e, Wx 4468 ft, abnd 4483 ft.

Okfuskee County—Failure: Manahan Oil's McMahan 1, sw sw nw 9-12n-10e, abnd 2685 ft.

Oklahoma County — Discovery: Stanolind's Johnson 1, nw sw ne 9-13n-1e, 2 Wx 5854 ft, perf in Hunton, flow 41 bbls oil, 5 wtr, 37-Gr, 5854 ft.

Pottawatomie County — Discovery: Stano-



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lind's Rosebud 1, sw sw sw 19-8n-2e, 2 Wx 6241 ft, SLC 6247-51 ft, F 355 bbls, 23 hrs, 1-in, 6251 ft.

WEST CENTRAL TEXAS

Jones County—North Avoca: Orion A. Daniel Prod. Co.'s Olson 1, 1064 ft nsl 990 ft ewl ne BBB&C Ry. sec 189, abnd 3259 ft.

Shackelford County: Roeser-Pendleton-Continental's Cook 13-A-118, 1034 ft nsl 340 ft wel ne E.T. Ry. sec 118, abnd 1808 ft.

WEST CENTRAL TEXAS WILDCATS

Stephens County—Brown Field New Pay: T. P. Coal & Oil Co.'s Jessie Brown 2-C, 3710 ft se 1074 ft ne of w cor BBB&C Ry. sec 114, but in J. G. Garrett sur A-68, elev 1091 ft, Bend 3222-3321 ft. Marble Falls 3976 ft, cherted dolomite 4340 ft, 5,700,000 gas, single perf 3980 ft, td 4372 ft, pb 4084 ft.

Taylor County—Failure: Lewis Prod. Co.'s Teaff 2, 330 ft out se cor lab 9, lge 122, W. R. Willis sur, elev 1795 ft, Dothan 1915 ft, Flippen 2295 ft, Canyon 3196 ft, abnd 3206 ft.

SOUTH CENTRAL TEXAS

Bastrop County—Bateman: Ralph Ogden's Riddle 3, 1320 ft fr el 330 ft fr nwl 1170 ft fr sw'ly swl 94-ac tr, William Leach sur, 5½-in 2196 ft, perf 2170-95 ft, pump 83 bbls, td 2209 ft.

SOUTH CENTRAL TEXAS WILDCAT

Gonzales County—Failure: G. W. Strake's Weber 1, 628-ac lse, Thomas Wright sur, 4 mi se Nixon, abnd 4808 ft.

SOUTHWEST TEXAS

Duval County—Sejita: Standard of Texas' Bazan 1, 500 ft fr nl 467 ft fr wl 396-ac lse, San Pedro Charco Redondo Gr, 5½-in 5776 ft, perf 5770-74 ft, 15 bbls, ⅛-in, td 5777 ft.

Jim Hogg County—Colorado: Humble's King Ranch-Colorado 29, 1980 ft fr nl 3960 ft fr wl AB&M sur 42, 640-ac lse, 5½-in 3180 ft, perf 3111-80, pump 35 bbls, td 3180 ft.

Jim Hogg County—East: Sun's East 6-D, 5250 ft fr most w'ly wl 4825 ft fr most s'ly sl 4480-ac tr, Santo Domingo de Arriba Gr, abnd 4784 ft.

Starr County—Guerra: Sun's Guerra 14-A, 2395 ft fr swl 1360-ac lse, 5½-in 2264 ft, sand 2244 ft, 96 bbls, 3/16-in, td 2274 ft.

Starr County—North Sun: Sun's Montalvo 5-C, 3200 ft fr nl 4600 ft fr wl 3870-ac lse, Los Retachez Gr, 5½-in 5126 ft, perf 5116-21 ft, 145 bbls, 9/64-in, td 5126 ft.

SOUTHWEST TEXAS NEW PAY

Duval County—Cadena: Taylor Refining Co.'s Garcia 4, 590 ft fr wl 2979 ft fr nl, Blackstone-Hardeman sur, 7-in 3525 ft, perf 3462-67 ft, 82 bbls, 9/64-in, td 5245 ft.

SOUTHWEST TEXAS WILDCATS

Jim Hogg County—Failure: Massingill & Spice's Palacios 1, blk 18, D. G. Duce sur 287, temp abnd 3107 ft.

Zapata County—Failure: John W. Mecom's 1, 4956-ac lse, abnd 602 ft.

LOWER TEXAS COAST

Bee County—South Caesar: Atlantic's Sparkman 1, 467 ft fr s&wl 52-ac lse, Thomas Powell sur, 5½-in 6689 ft, perf 6579-90 ft, 154 bbls, 5/32-in, td 6845 ft.

Jackson County—West Ranch: Humble's Toney 9-B, 3246 ft alg nel fr e cor 496-ac lse, R. Musquez Gr, 5½-in 5735 ft, perf 5552-60 ft, 194 bbls, ¼-in, td 5737 ft.

Magnolia's West Ranch 261-A, 7230 ft fr swl 11,582-ac lse, R. Musquez Gr, 7-in 5590 ft, perf 5558-88 ft, est 68,000,000 gas open, td 5591 ft.

Jim Wells County—Seeligson: Oil Fuel Oil Supply's Hewitt 1, 330 ft fr s&el lot 25, sec 50, Seeligson Rch, Richard Ross sur, 5½-in 6240 ft, dual comp, perf 4852-56 ft, 108 bbls, ⅛-in; perf 5923-28 ft, 5945-51 ft, 133 bbls, ⅛-in, td 6250 ft.

Sun's Canales 22, 660 ft fr nl & abt 440 ft fr wl, A. Canales sur 64, 3000-ac lse, dual comp, 5½-in 6018 ft, perf 5382-95 ft, dry gas; perf 5941-50 ft, 145 bbls, ⅛-in, td 6020 ft.

Sun's Canales 24, 990 ft fr el 3300 ft fr wl 3145 ft fr nl, J. E. Stevens sur 364, 3000-ac lse, se flank, 5½-in 6038 ft, dual comp, perf 5242-50 ft, 140 bbls, ⅛-in; perf 6016-26 ft, 135 bbls, ⅛-in, td 6040 ft.

Kleberg County—Kingsville: King-Tex's Gulf 1, 315 ft fr wl 610 ft fr sl se¼ sec 40, G. Trevino Gr, 5½-in 2959 ft, perf 2903-06 ft, 99 bbls, ⅛-in, td 2959 ft.

Nueces County—East White Point: Sinclair's State-Bay 3 (974), 330 ft fr w'ly el 220 ft fr w'ly wl tr 974, 235-ac tr, dual comp, 5½-in 5975 ft, perf 5815-20 ft, 130 bbls, ⅛-in; perf 5595-5603 ft, 119 bbls, ⅛-in, td 6020 ft.

Willacy County—Willamar: Lyons & Prentiss' Olivares 1-A, 467 ft fr nl 533 ft fr el 75-ac tr, share 12, San Juan de Carricitos Gr, 5½-in 7938 ft, perf 7896-7935 ft, 188 bbls, 5/32-in, td 7942 ft.

LOWER TEXAS COAST WILDCATS

Brooks County—Failure: LaGloria Corp.'s Miller 1, lot 66, Ballard subdvn, Los Olmos Y Loma Blanca Gr, abnd 7338 ft.

Goliad County—Discovery: Fred W. Shield's Terrell 1, 1800 ft fr sl 2370 ft fr wl 5555 ft fr el 800-ac lse, Antonio Siedeck sur, 4 mi se Fannin, 5½-in 4850 ft, perf 4650-65 ft, 156 bbls, 5/32-in, Opens Terrell Point field.

Live Oak County—Failure: Henderson Coquat's Buckaloo 1, 50-ac tr, W. Harris Tr, Richard Everett sur, abnd 6505 ft.

Refugio County—Failure: P. R. Rutherford's Trull 1, LaRosa area, 140-ac tr, Johnson & Pugh subdvn, Aldrete Gr, abnd 6550 ft.

TEXAS GULF COAST

Brazoria County — Old Ocean: Magnolia-J. S. Abercrombie's Reeves 1, 80-ac tr, Battle, Berry & Williams sur, w side, dual comp, 7-in 11,009 ft, perf 10,052-72 ft, 442 bbls, ¼-in; perf 10,130-150 ft, 376 bbls, ¼-in, td 11,009.

Chambers County—Fig Ridge: C. M. & V. W. Frost's Fee 4, 467 ft fr n&el 40-ac unit, 5½-in 8590 ft, t/sand 8502 ft, 292 bbls, 10/64-in, td 8590 ft.

J. M. Frost III's Fee 4-A, 320-ac trs, HT&B sur, A-149, sec 95 t/sand 8473 ft, 5½-in 8585 ft, perf 8493-8520 ft, 156 bbls, ⅛-in td 8586 ft.

Chambers County—Cedar Point: Standard of Texas' State-Galveston Bay 118-2M, 3080 ft fr nel & 1570 ft fr nwl sec 118, 7-in 4497 ft, t/sand 4447 ft, 192 bbls, 5/32-in, td 4498 ft.

Jefferson County—Fannett: Gulf's Bordages 13, 320-ac tr, abnd 8297 ft.

Liberty County—Hull: American Republics-Houston Oil's Fee 137, 800-ac lse, Jesse Devore sur, 2890 ft fr sl 2120 ft fr el, 7-in 2607 ft, perf 2540-60 ft, pump 42 bbls, td 2607 ft.

Matagorda County—North Markham: Ohio Oil Co.'s Carlson 22, blk 9, 2779-ac tr, I&GN sur 1, 5½-in 8104 ft, perf 7718-23 ft, 241 bbls, ⅛-in, td 8125 ft.

Tyler County—Fred: Stanolind's Parker 4, 3404-ac lse, abnd 8644 ft.

TEXAS GULF COAST WORKOVER

Matagorda County—Hamman: Hamman Exploration Co.'s Sloan 3, 180-ac lse, e side field, orig comp 3-27-39, t/sand 8158 ft, perf 8158-62 ft, 116 bbls ½-in, drilled to new td 9330 ft.

TEXAS GULF COAST WILDCATS

Colorado County — Failure: Cities Service Lehrer 1, 1475-ac lse, Heirs of Naham Mixon sur, abnd 9802 ft.

Jefferson County—Failure: Glenn H. McCarthy's Tyrell 1, 429-ac tr, sec 82, W. C. Dunchie sur, 5 mi nw Hamshire, abnd 7525 ft.

Matagorda County—Failure: Atlantic's Kountze 1-A, nw Markham, 162-ac tr, W. H. Gainer sur 550, abnd 8680 ft.

Waller County—Failure: Jack W. Frazier & Victor Prassel's Hempstead 1, Hempstead area, ne¼ blk 481, abnd 5059 ft.

EAST TEXAS

Wood County—Manziel: Sun's W. L. Johnston 1, 467 ft snl 1475 ft ewl John Folk sur, Georgetown 5078 ft, Ft. Worth 5687 ft, Paluxy 6275 ft, sand 6302 ft, flow 473 bbls, ¼-in, perf 5359-69 ft, td 6432 ft.

EAST TEXAS WILDCATS

Kaufman County—Failure: M. J. Delaney et al's Rutledge-Sun 1, E. Parsons sur, abnd 649 ft.

Upshur County—Failure: Bobby Manziel et al's Reynolds 1, 1480 ft nsl 2720 ft wel, Chas. O'Neal sur, elev 332 ft, Pecan 2560 ft, Austin 3620-3667 ft, Woodbine 3756 ft, Georgetown 4100 ft, Paluxy 5325 ft, abnd 5585 ft.

Wood County—Failure: Plains Prod. Co.'s Cox 1, 160 ft wel 2150 ft nsl, Joseph Simpkins sur, elev 431 ft, Pecan 2375-2510 ft, Austin 3595-3890 ft, Woodbine 4353 ft, Georgetown 5105 ft, Ft. Worth 5680 ft, Goodland 6220-85 ft, Paluxy 6290 ft, massive anhydrite 7835-8025 ft, Pettit 8650 ft, Travis Peak 8822 ft, abnd 9000 ft.

NORTH TEXAS

Archer County—Chalk Hill: Deep Oil Dev. Co.'s Wilson 27, 650 ft snl 1815 ft ewl lot 1, ATNCL sec 119, Bend 4926 ft Ellen 5340 ft, pump 76 bbls, 4000 gals acid, perf 4926-45 ft, td 5443 ft.

Archer County: W. F. Palmer et al's Harmel 13, 1010 ft nsl 1068 ft wel sec 2401, abnd 1356 ft.

Clay County: Fortex Oil Corp.'s Dallas Joint Bank-Texaco 11, 5200 ft fr sel 200 ft fr swl sec 35, J. Duncan sur, pump 33 bbls, 1118-41 ft.

Johnson & Gorman's Cheeves 4, 1650 ft nsl 836 ft wel blk 55, Bacon sur, pump 39 bbls, 1136-43 ft.

Clay County—Joy: Shell's Scaling 3, 330 ft snl 1320 ft ewl blk 15, H. Williams sur, pump 110 bbls, shot 130 qts 3991-4004 ft, td 4019 ft.

Cooke County: Texas Co.'s Cooke 2, 600 ft wel 150 ft nsl lse, n½ A. Patterson sur, pump 47 bbls, 1155-68 ft.

Cooke County — Walnut Bend: Sinclair Prairie's Henderson 1, 384 ft wel 43 ft snl blk 62, Fannin CSL, Winger 5518 ft, abnd 5569 ft.

Jack County—Hoefle: Standard of Texas' Jackson 1, 638 ft nsl 495 ft wel S.P. Ry. sec. 1, A-578, flow 408 bbls, ¼-in, 3000 gals acid 4747-56 ft.

Montague County—Hildreth: Continental's Kaneaster 2, 408 ft snl 987 ft wel nw E.T. Ry.

sec 56, Bend 6057 ft, flow 1262 bbls, ½-in, perf 6108-49 ft, td 6450 ft.

Throckmorton County: Combined Oil Co. et al's Housley 22, 150 ft snl 1300 ft wel sec 28, Comanche Indian Res., pump 20 bbls 722-34 ft.

Grisham-Hunter Corp.'s Kelley 1, 200 ft snl 1000 ft wel s½ sec 51, Comanche Indian Res., abnd 970 ft.

Wichita County: Magnolia's Lawler 16, 942 ft snl 1021 ft wel sec 17, Red River Valley Lands, pump 2 bbls, 1636-55 ft.

W. T. Waggoner Est.'s Fee 1-NN, 200 ft s 2100 ft e of se cor H&TC 34, blk 5, in A. Gibson sur A-455, Ellen 3658 ft, abnd 3774 ft.

Wichita County — Airport: Consolidated's Krizan 1, 495 ft out nw cor blk 43, Cherokee CSL, abnd 4475 ft.

NORTH TEXAS WILDCATS

Archer County—Failures: T. L. Wheeler et al's Penartz 1, 150 ft wel 1100 ft nsl sec 19, blk 4, Clark-Plumb sur, abnd 1162 ft.

Akin-Dimock-Bridwell Oil Co.'s Conrady 1, 200 ft snl 1000 ft ewl sec 101, blk 4, Clark-Plumb sur, abnd 1218 ft.

Childress County—Failure: John A. Murphy Jr. et al's Clark 1, c se nw H&GN 6, blk 9, elev 1709 ft, Clear Fork-Wichita Albany contact 1870 ft, Cisco 3090 ft, Canyon 4120 ft, Strawn 5140 ft, Mississippi 6205 ft, abnd 6505 ft.

Clay County—Failure: Cable Oil Co.'s Langford 1, 300 ft snl 800 ft wel, J. L. Myers sur A-986, abnd 1365 ft.

Cooke County—South Walnut Bend New Pay: Seitz-McElreath-Snuggs and Roy Guffey's Blankenship 1, 330 ft out ne cor sec 46, Fannin CSL, elev 803 ft, Winger 5556 ft, pump 35 bbls, perf Strawn sand 4478-83 ft, td 5614 ft.

Cooke County—Failure: M. P. Springer-C. E. Marshall's Fee 1, 4869 ft wel 330 ft snl 501-ac tr, Alex Horton sur A-443, Simpson 5345 ft, Ellen 5760 ft, abnd 5842 ft.

Jack County—Discovery: Shell's W. T. Pursley 1, 330 ft out ne cor N. A. Slaughter sur A-1649, Palo Pinto 1510 ft, Bend 4595 ft, Marble Falls 5014 ft, Barnett 5336 ft, Mississippi 5438 ft, Ellen 5822 ft, pump 25 bbls oil, 15 bbls wtr, 16,000 gals acid, shot 100 qts nitro 5531-5631 ft, td 6011 ft, pb 5634 ft.

Montague County—Failures: Continental's St Jo 1st. Nat'l Bank 1, 166 ft wel 315 ft nsl, J.Lobley sur A-779, granite wash 4260 ft, granite 4387 ft, abnd 4403 ft.

Continental's Heard 1-A, 330 ft out se cor e-49 ac of w-111 ac of S. O. Bridgewater sur A-109, Bend 6367 ft, abnd 6699 ft.

Montague County—Dodson New Oil Pay: Phillips' C. P. Dodson-Dod 3, 3356 ft ewl 1796 ft nsl of 435-ac tr, T. R. Jackson sur A-394, elev 932 ft, Bend 5018 ft, flow 678 bbls, 42/64-in, Bend cong 5200-08 ft.

TEXAS PANHANDLE

Hutchinson County: Gulf and Panhandle's Dial 114, 710 ft snl 2360 ft ewl H&OB sec 1, blk XO2, pump 210 bbls, 38.6-gr, shot 550 qts 2935-45 ft, td 3049 ft.

Shamrock O&G Corp.'s McDowell 4, 660 ft snl 1980 ft wel, J. D. Burnett sur No. 13, flow 394 bbls, 3222-30 ft.

TEXAS PANHANDLE WILDCAT

Donley County — Failure: Stanolind-Texas Co.'s Broome 1, c se se H&GN 46, blk 20, elev 2274 ft, top granite 6748 ft, abnd 6753 ft.

WEST TEXAS

Andrews County—Mascho: Phillips' University 4-D, 2033 ft wel 1934 ft nsl sec 4, blk 10, flow 286 bbls, ¼-in, 5000 gals acid, 4400-4615 ft.

Crane County—Sand Hills: Lario O&G Co.'s Tubb-Humble 3-D, c se se PSL 8, blk B-32, flow 1055 bbls, ¾-in, 500 gals acid, Clear Fork perf 4280-4412 ft, td 4554 ft.

Ector County—Foster: Cities Service's Bagley 5-B, sw ne nw T&P 4, blk 42, T-2-S, pump 182 bbls, shot 250 qts 4235-4310 ft.

Ector County—North Cowden: Stanolind's Midland Farms 1, Unit 5, 785 ft snl 2055 ft ewl G&MMB&A 47, blk 42, T-1-N, pump 113 bbls, shot 380 qts 4485-4610 ft, td 4680 ft.

Fisher County — Howard: Northern Ordnance's Howard 1, c sw nw H&TC 180, blk 2, elev 1922 ft, pump 25 bbls, Crystal Falls lime 3709-27 ft.

Gaines County—Seminole: Magnolia-Atlantic's H. & J. 9-193, c ne se W.T. Ry. 193, blk G, flow 151 bbls, ½-in, shot 120 qts 5150-98 ft.

Hockley County—Slaughter: T. F. Morrow et al's Mallet 50, 580 ft out se cor lab 3, lge 48, Edwards CSL, flow 591 bbls, 2-in, 10,000 gals acid, 4893-4935 ft.

T. F. Morrow et al's Mallet 60, 580 ft out nw cor lab 1, lge 48, Edwards CSL, flow 586 bbls, 12,000 gals acid, 4860-4907 ft.

Stanolind's Slaughter 44-B, 2974 ft snl 957 ft wel lab 1, lge 40, Maverick CSL, flow 674 bbls, 10,500 gals acid, 4977-5047 ft.

Mitchell County—Westbrook: Col-Tex Ref. Co.'s Pettitfils 1-A, 1627 ft snl 1025 ft ewl T&P 14, blk 28, T-1-N, pump 105 bbls, shot 290 qts & 820 qts 2970-3115 ft.

Col-Tex Ref. Co.'s Standard of Texas 5, 1660 ft snl 2332 ft ewl T&P 15, blk 28, T-1-N, pump 25 bbls oil, 54% bs&w, shot 490 qts 2945-3111 ft, td 3138 ft.

Terry County—Slaughter: Gulf's Mallet 15, 3090 ft snl 440 ft ewl C&M sec 5, blk D-11, flow 1118 bbls, 12,000 gals acid, td 5050 ft.

Yoakum County—Owenby: Shell's Hammer 2, c sw nw sec 490, San Andres 4720 ft, flow 153 bbls oil, 11% bs&w, 1-in, 4000 gals acid, perf 5250-5394 ft, td 5410 ft.

Sinclair Prairie's Granger 2, c ne se sec 487, San Andres 4700 ft, flow 94 bbls oil, 23% bs&w, ¾-in, 1500 gals acid 5240-5355 ft.

WEST TEXAS OLD WELL DEEPENED

Ector County—North Cowden: Stanolind's Midland Farms 1-E, 3300 ft nsl 440 ft ewl sec 100, W. L. Callahan sur, otd 4430 ft, pump 46 bbls oil, 4.6% bs&w, shot 960 qts 4355-4536 ft, td 4561 ft.

WEST TEXAS WILDCATS

Ector County—Failures: Danciger O&R's Cowden 1, 858 ft nsl 1834 ft wel T&P 10, blk 42, T-3-S, elev 2868 ft, abnd in sul w 4960-5001 ft.

Grisham-Hunter Corp.'s Cowden 1, c sw sw T&P 10, blk 45, T-2-N, abnd 6495 ft.

Gaines County—Failure: Texas Co.'s Parmer 1, 660 ft ewl 685 ft snl lge 317, Parmer CSL sur, elev 3120 ft, anhydrite 2155 ft, base salt 2321 ft, Yates 3350 ft, solid lime 3850 ft, abnd 8097 ft.

Pecos County—Failures: Globe O&R Co-Forest Dev. Corp's Colden 1, c s¼ of s¼ H&GN 40, blk 10, elev 2419 ft, anhydrite 511 ft, Yates 1270 ft, San Andres 2230 ft, Detrital 5010 ft, Simpson 5145 ft, Waddell 5770 ft, Ellen 6190 ft, abnd 6236 ft.

Siemoneit Dr. Co.-E. M. Wahlenmaier's Crockett-Shell 1, c w¼ of w¼ H&TC 28, blk 2, elev 2366 ft, Ellen 4700 ft, abnd 4812 ft.

United States Wildcat Starts

ARKANSAS

Ouachita County: Garland Anthony's Shankle 1, c sw se se 33-12s-18w, lcn.

CALIFORNIA

Kern County: General Petroleum's Railroad 3, se ne ne 23-28-28, Shark Tooth area, lcn.

Harp & Brown's Olcese 2, nw ne ne 17-28-29, Round Mountain area, lcn.

Judy K. Oil Co.'s El. Tejon 1, 430 ft s 1320 ft e c 22-30-30, Edison Southwest area, rig.

Union's Richardson 53, nw sw ne 18-29-21, Goul Hills area, mim.

Orange County: General Petroleum's Heath 1, ne ne ne 34-3s-11, Buena Park area, mim.

Yolo County: Superior's Capay Grant Comm. 1, nw se sw, Ord Bend area, rig.

ILLINOIS

Week Ending January 1, 1944

Edwards County: Big Chief Drlg Co.'s Clayton Bunting 1, sw se se 29-1s-10e, lcn.

Fred Noah et al's E. West 1, s½ se nw 28-2s-10e, lcn.

Hamilton County: Holbert & Leach's Leach-Gilpin 1, sw ne 14-4s-6e, lcn.

Hancock County: Dale Hopkins' Edgar Alashire 1, nw nw ne 18-4n-5w, dr.

Kendall County: Herndon Drlg. Co.'s Rose Proctor 1, ne ne se 36-36n-8e, lcn.

Marion County: Leland Waggoner's Green 1, ne ne nw 28-5n-4e, lcn.

Schuyler County: Amberg & Miller's Taylor 1, se ne ne 30-1n-1w, lcn.

Wabash County: Bennett Bros.' L. Hurze 1, nw nw sw 12-2s-14w, lcn.

Washington County: Harry Hubbard's H. Schriefer 1, nw nw nw 3-1s-3w, lcn.

ILLINOIS

Week Ending January 8, 1944

Clinton County: K. McConnell et al's A. Joffray 1, ne ne se 2-1n-3w, dr.

Edwards County: Superior's V. A. Curtis 1, nw sw ne 32-1s-14w, dr.

Washington County: E. J. Ruwalt's F. Brinkman 1, nw ne sw 14-2s-5w, lcn.

White County: Burt Lambert's F. Harlem 1, nw sw ne 15-7s-10e, dr.

INDIANA

Week Ending January 1, 1944

Posey County: Farm Bureau's Blackburn 1, s½ sw nw 20-6s-13w, dr.

Spencer County: Sohio et al's M. Baird 1, sw sw nw 26-7s-7w, lcn.

INDIANA

Week Ending January 8, 1944

Sullivan County: Farm Bureau Oil Co.'s A. N. Taylor 1, c nw nw 8-9n-9w, lcn.

KANSAS

Week Ending January 1, 1944

Butler County: Marion Oil Co.'s Schweiter 1, sw nw ne 19-28s-8e, dr 950 ft.

Cowley County: Northern Ordnance's Bailey 1, nw sw se 8-33s-5e, rur.

Graham County: Bridgeport's White "B" 1, ne ne se 25-10s-21-w, spud.

Greenwood County: C. O. Whittaker et al's Snider 1, c w½ sw se 9-26s-10e, rum.

Ottawa County: Central States' Central Life 1, c nw nw 34-12s-3w, rur & sd.

Rice County: Great Lakes' Sylvia Reiff 1, se nw sw 17-18s-10w, lcn.

Rockhill Stone & Gravel's Buell 1, c w½ ne ne 33-21s-8w, lcn.

Saline County: M. B. Armer & W. H. Lassen's Olson 1, c ne ne 27-13s-1w, rig.

Stafford County: Skelly's Landreth 1-A se se ne 33-24s-14w, rur.

W. P. Faulkner's Cadman 1, se se nw 4-25s-13w, bldg rig.

KANSAS

Week Ending January 8, 1944

Barton County: Texas Co.'s Harper 1, c nw nw 10-18s-14w, dr 340 ft.

Vickers' Kent 1, ne nw ne 31-19s-13w, lcn.

W. L. Hartman's Powell 1, c w½ nw nw 1-20s-13w, mir.

Western Exploration Co.'s Titus 1, ne ne nw 19-20s-13w, Artesian wtr, will skid, 1100 ft.

Cowley County: W. G. Talbott's S. C. Hann 1, ne se nw 22-31s-3e, dig cellar, mir.

Appleman et al's L. M. Wilson 1, sw sw sw 9-32s-3e, lcn.

Ellsworth County: Bridgeport's Larson "A" 1, sw nw ne 1-17s-6w, rur.

Greenwood County: Havlic's Sample 1, c nw sw 27-26s-13e, lcn.

Kiowa County: Viersen & Cochran's C. Butler 1, ne ne nw 22-27s-19w, lcn.

McPherson County: Appleman et al's Gomer 1, se sw ne 23-18s-5w, c&p.

Pratt County: Bishop Oil's Hensley 1, ne se ne 23-26s-14w, dr 1405 ft.

Reno County: Mid-Continent's M. DeMuth 1, c se sw 11-24s-9w, lcn.

Rooks County: Cities Service's Sikes 1, sw sw se 27-9s-19w, lcn.

Russell County: Nadel & Gussman's Luermann 1, se se ne 24-15s-13w, dr 1790 ft.

Sedgwick County: T. Jeff Archers' Branine 1, c ne nw 19-27s-4w, lcn, sd.

Stafford County: Helmerich & Payne's Zimmerman 1, se se se 29-23s-13w, bldg rig.

Appleman et al's Fisher 1, c s½ sw ne 30-21s-12w, lcn.

Woodson County: Havlic et al's Fegan 1, c se sw sw 11-26s-14e, dr 710 ft.

KENTUCKY

Week Ending January 8, 1944

Todd County: Hobson & Putnam's Minnie Russell 1, 16-D-29, lcn.

Union County: Trans-Tex and Ashland's H. C. Culver 1, 12-P-20, lcn.

NORTH LOUISIANA

Bossier Parish: J. R. Hayden Trust's Ellerbe 1, 1170 s 660 w of ne cor 3-20n-13w, lcn.

MICHIGAN

Allegan County: W. H. Clock's Burigh 1, ne se ne 5-1n-15w, lcn.

OKLAHOMA

Week Ending January 1, 1944

Carter County: C. W. Tomlinson's Jackson 1, sw se sw 26-5s-1e, lcn.

Greer County: E. K. McLennan's Briggs 1, nw nw nw 31-6n-21w, dr 695 ft.

Love County: F. W. Merrick's Tate 1, se ne 6-6s-2e, tools.

Stephens County: B. F. Lundy's Kincannon 2, nw sw ne 14-1n-6w, lcn 2500-ft test.

Washita County: Gulf's Hare 1, se ne sw 8-8n-20w, lcn.

OKLAHOMA

Week Ending January 8, 1944

Carter County: E. M. Boring's Nance 1, sw nw se 1-4s-3w, lcn.

Hughes County: Aladdin Petroleum Co.'s Austin 1, c sw nw 4-7n-10e, dr 500 ft.

Lincoln County: Creekmore-Rooney's Sturdivan 1, se nw nw 33-12n-5e, lcn.

Pawnee County: Northern Ordnance's Morris Brown 1-A, nw se sw 20-23n-3e, lcn.

Northern Ordnance's Blackhawk 1, sw ne nw 16-22n-3e, mir.

Payne County: Stanolind-Amerada's School Land 15 1, 16-19n-4e, lcn.

Seminole County: F. P. Lanahan's Collier 3, ne se ne 13-7n-7e, dr 990 ft.

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STANDCO BRAKE LINING
Is the driller's best friend because it makes the easiest brake known and "feeds off" evenly while drilling. It never scores brake rims. See page 2808 Composite Catalog.
Standco Brake Lining Co.
HOUSTON

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at the well
ASSOCIATED ENGINEERS
GAS LABORATORY
1912 WEST GRAY HOUSTON, TEXAS

THE FORT WORTH LABORATORIES
Analysis of oil field brines, cores, gas, oil and minerals. Field gas testing. R. H. Fash, Vice President; Long Distance 138. 823½ Monroe Street, Fort Worth, Texas

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When you stop at The Roosevelt you don't risk getting marooned like this. For you'll be within walking range of Manhattan's Midtown activities. Direct passageway from Grand Central Terminal to hotel lobby. A reservation at The Roosevelt liquidates a lot of bother. *Rooms with bath from $4.50.*

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WEST TEXAS

Borden County: Northern Ordnance's Clayton-Johnson 1, c nw nw T&P 33, blk 31, T-4-N, lcn.

Coke County: Warren Pet. Co.'s Fowler 1, c nw nw H&TC 275, blk 1-A, lcn for Ordovician test.

Gaines County: L. L. Horne Oil Co.'s Norman 1, c ne nw PSL 8, blk C-45, lcn 5500-ft test.

WEST CENTRAL TEXAS WILDCAT STARTS

Coleman County: Patrick A. Trapp et al's S. H. Stephens 1, 150 ft out sw cor se HT&B 21, blk 1, lcn 750-ft test.

Shackelford County: C. A. Montgomery et al's G. W. Norton 2, 1600 ft fr nwl 1140 ft fr swl TE&L sec 567, lcn 600-ft test.

SOUTH CENTRAL TEXAS

Wilson County: Sullivan & Garnett's Moczygemba 1, 90-ac lse, Luis Manchaca Gr, lcn 5500-ft Wilcox test.

TEXAS GULF COAST

Fayette County: R. T. Wilson's Levien 1, 96-ac tr, James Winn lge, lcn 5500-ft test.

Tyler County: American Republics-Houston Oil's Cushing Fee 3-R, 1 mi s Joe's Lake field, lcn.

Matagorda County: Atlantic's Kountze 1-B, 158-ac tr, W. H. Gainer sur 550, lcn 8500-ft test.

Trinity County: Navarro's Bolton 1, blk 88, Henry Bond sur, 3 mi se Saron, lcn 6000-ft test.

Wharton County: J. B. Ferguson & W. Stewart Boyle's Kubela 1, 190-ac lse, H&TC sur 5, 6 mi w Pierce, lcn 5000-ft test.

EAST TEXAS

Anderson County: Magnolia's Henry Horwitz 1, 467 ft ewl 990 ft nsl of 146.08-ac tr, Jesse B. McNeely Lge, lcn for 10,000-ft Travis Peak test on e edge Concord pool.

Henderson County: E. B. Germany et al's A. C. Bentley-Magnolia 1, 467 ft snl 750 ft wel 94.3-ac tr, Nathaniel Addison sur, lcn Woodbine test.

L. O. McMillan et al's Ella Warren 1, 330 ft wel 1260 ft nsl 89-ac tr, Eliza Edwards sur, Pecan 2770 ft, dr 3710 ft.

Limestone County: Fohs Oil Co.-J. A. Haffner Jr.'s W. E. Black 1, 330 ft out se cor 56.8-ac tr, L. Norvell sur, lcn.

NORTH TEXAS

Archer County: Hedrick Oil Co.'s J. J. Brockheuser 1, 1110 ft snl 200 ft wel sec 87, blk 4, Clark-Plumb sur, lcn 1200-ft test.

Frank Wood et al's C. L. Abercrombie 1-A, 1200 ft nsl 200 ft wel, W. A. Rucker sur A-1110, lcn 1550-ft test.

Squeaks from the Bull Wheel

No Mathematician

Customer: You don't seem quick at figures, my boy.

Newsie: I'm out of practice, sir. Most people say "Keep the change."

She Was Suspicious

"My wife is scared to death someone will steal her clothes."

"Doesn't she have them insured?"

"She has a better idea. She has some guy stay in the closet and watch them. I found him there the other night."

Appreciative Son

"Yes, son, I'm a self-made man."

"Gee, dad, that's what I like about you. You take the blame for everything."

False Description

"I was rather disappointed in that gentleman you introduced to me last night."

"How so?"

"Why, you spoke of him as a bridge expert, and he turned out to be nothing but a famous engineer."

He Just Doesn't Suit

A farmer was trying to sell a broken-winded horse to the Army, and was trotting him around for inspection. He stroked the animal's back and said to the buyer, "Hasn't he got a lovely coat?"

"Sure, his coat's all right, but I don't like his pants."

Rapid

"You claims you is fast! You says you's so fast folks calls you Speedy! Jest how fast is you, boy?"

"I'll tell you how fast I is. In my room dere's jes' an 'lectric light, and it's forty feet frum ma baid. When I'se undressed I kin walk over to dat 'lectric light and turn it out and git into baid and be covered up befo' de room gits dark."

Helps

"They tell me Smith has a right good voice. Is he cultivating it?"

"I can't say about the cultivating but I know he irrigates it frequently."

Two-Way Beauty

"That girl's as pretty as a picture."

"Nice frame, too."

Drunk Story

The drunk was walking a wavering line down Main Street, stopping every little while and trying to guess where he was. At last he turned to a passerby and asked, "Mister, where am I?"

"You're at the corner of Main and First streets."

"Never mind the details," exclaimed the bewildered one, "what city?"

Announcing the 9th Annual
OIL & GAS LAW LECTURE SERIES
Sixteen lectures by seven prominent Houston attorneys offering men and women the benefit of many years of experience on legal points of Leases, Royalties, Operating Agreements, Governmental Regulations, etc. 8 to 10 p.m. each Thursday beginning January 13th. Mimeographed copies of Lecture Series $5.00. For information call W. H. Randolph.
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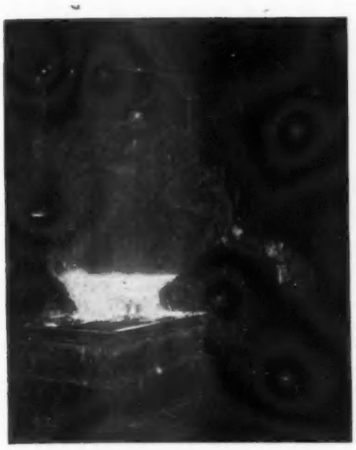
VICTORY MUST COME FIRST

DEDMAN'S part in the war effort has been so outstanding that leading war manufacturers have written us unsolicited letters with such statements as:



"... commendation for the very fine piece of work you are doing for us on our steel castings."

"... excellent quality."

"... deliveries according to promised dates."

"... outstanding ..."

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POST-WAR—You want such a dependable source of high quality castings for your post-war manufacturing. Talk it over with us now.

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Used Oil Field *and* Industrial Equipment

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Casing *and* Line Pipe

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Drilling Equipment

•

Valves, Flanges, Swages, Fittings *and* Couplings

•

Casing Pulling *and* Shooting

•

Pipe Straightening, Testing, Machine Work

•

Rental Service:
Equipment *and* Tools, Drill *and* Line Pipe, Tongs, Slips, Spiders, etc.

SPECIAL

12 x 12 Gardner-Denver Twin Cylinder Engine Model E. A. 1000 — Slide Valve — Fully Enclosed — On Skids.

15¼ x 7¾ x 20 Gardner-Denver Mud Pump Model F. B. — Slide Valve — On Skids.

14½ x 7¼ x 20 Gardner-Denver Mud Pump Model E. L. — Slide Valve — On Skids.

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OILFIELD SALVAGE CO., INC.

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HOUSTON 1, TEXAS

Sawyer's FROG BRAND OILED WORK CLOTHING

Todays busy world requires that many men work in conditions of moisture or actual wetness, sometimes from rain, sometimes from commercial or industrial processes. To all such men, Frog Brand Work Oiled Clothing by Sawyer offers comfortable, lightweight protection.

THE H. M. SAWYER & SON CO.
East Cambridge, Mass.

GET SET FOR THE WET!

Notes for the Equipment Buyer and User

Gun Perforator and Production Tester

McCULLOUGH TOOL COMPANY

McCullough Tool Company, 5820 South Alameda Street, Los Angeles, has developed a combination gun perforator and production tester, which perforates the casing and gives a gauge of the productiveness of a zone on a single run into a well.

The gun casing tester is run on drill pipe or tubing. Accurate pipe measurements are utilized to assure the locations of perforations in the exact zone designated for testing.

The outfit consists of a production tester with a gun perforator attached below it. The perforator may be a short unit for firing one to four shots, or it may be a standard gun which shoots 10, 20 or 30 shots in a five-foot section. A number of guns may be joined together to cover the extent of the zone to be tested.

Operation of the tester is as follows: When stationed at the zone to be tested, the gun tester is fired and the control head or Christmas tree attached to the production string. The tester is then raised and set above the perforated area and the sample-taking valve is opened. Setting the tester isolates the zone being tested from the hydrostatic pressure so that the test is made under formation pressure only and before the zone can be contaminated by the well fluid, thus assuring an accurate gauge of the productiveness of the zone. When a number of zones are to be tested, the uppermost one is tested first and the others in succession, working downward, a procedure which eliminates plugs or squeeze jobs between tests.

In addition to its use in testing for oil production, the gun tester may be used in testing for water shut-off and also for determining the success of squeeze cementing operations. The tool may be run with or without a water cushion, and due to its design, it releases easily after the test, whether wet or dry.

Synchronous Motors

General Electric Company, Schenectady, New York, has published a bulletin on synchronous motors and control for compressor drives. The publication, GEA-4139, describes the application of low-speed synchronous motors, emphasizing the necessity of providing in the installation the proper amount of flywheel effect to avoid excessive current pulsations, lists the most important construction features, especially in respect to the rotors and stators, and discusses the synchronization, field removal and motor protection afforded by the GE synchronous motor control.

Heavy Duty File

KENNAMETAL, INCORPORATED

Kennametal, Incorporated, 184 Lloyd Avenue, Latrobe, Pennsylvania, announces a new type of file, F76, designed to meet the present day demand for a file to stand hard service.

Trials have demonstrated that this file

Inset shows portion of filing surface actual size, unretouched.

will permit filing speeds of three to ten times that possible with steel files. It will cut steels of a hardness up to 62 Rockwell C, and can be used on cast iron and brass at surface speeds around 900 feet per minute. The file is 11 inches long, ¾ inches wide, and ⅜ inches thick, with a substantial filing surface 4 inches long, made of grade K4H Kennametal, single cut with teeth at 30 degree shear angle, 40 per inch. Convenient grips are provided for the operator's hands.

Geological Bulletin

The Geological and Economic Survey of West Virginia, Box 879, Morgantown, West Virginia, has published Bulletin No. 7, "Rock Salt Deposits of West Virginia," by Dr. James H. C. Martens, mineralogist of the Geological Survey. Copies are available at a cost of 50 cents plus tax.

Geology Publications

The Bureau of Economic Geology, University of Texas, Austin, Texas, has published a news letter for December listing publications of the Bureau now in press. Publications for November are also listed in a separate bulletin.

Butterfly Valves

R-S Products Corporation, Wayne Junction, Philadelphia 44, has issued a 36-page catalog which describes a complete line of butterfly valves. The catalog is illustrated with both manual and power operated valves for pressures from 15 to 900 pounds.

Lufkin Company Wins White Star Award

Lufkin Foundry & Machine Company has been awarded the white star to add to the Army-Navy "E" previously awarded, for continued high standard in production of war material and equipment. The company, peacetime manufacturers of reduction gear oil well pumping units, is engaged in the manufacture of Howitzer gun carriages, General Sherman tank gears, 1000-horsepower ship-propulsion gears, turbo electric gear generators, practice bombs, and truck-trailers. The Army-Navy "E" for excellence in production was awarded this company in June, 1943.

Westinghouse Editorial Service Moves

Westinghouse Editorial Service has moved from East Pittsburgh, to Pittsburgh, Pennsylvania, and is now located in the Park Building, corner Fifth and Smithfield streets. Mail should be addressed to 306 Fourth Avenue, P. O. Box 1017, Pittsburgh 30, Pennsylvania.

Wire-Rope Maintenance

Macwhyte Company, Kenosha, Wisconsin, has compiled a booklet on wire-rope conservation. The booklet consists of a series of illustrated articles on the use and maintenance of wire rope, designed to help conserve this vital product for the duration of the war. Since the demand for wire rope has been much greater than the combined efforts of all manufacturers could produce, it is of paramount importance to make the present supply last as long as possible.

Subjects covered in the booklet include: Why corrosion shortens the life of wire rope; how sheave materials affect wire rope service; how wire rope life can be lengthened by proper sheave maintenance; the importance of an adequate safety factor for wire rope; how thorough lubrication lengthens the service life of wire rope; correct rope reeving saves wire rope; protecting wire rope against corrosion; practical methods of lubricating wire rope; and others of similar character.

Requests for copies of the bulletin should be made on company letterheads.

Centrifugal Pumps

Worthington Pump and Machinery Corporation, Harrison, New Jersey, has published two bulletins on monobloc centrifugal pumps, No. W-321-B14B on the single stage pump, and No. W-321-B15 on the two-stage pump.

Both bulletins are illustrated and contain extensive technical data.

Drilling Equipment

Oil Well Supply Company, Dallas, Texas, announces catalog No. C-47, which illustrates and describes "Oil-well" machinery and equipment for the drilling industry.

The catalog is divided into sections as follows: Rotary drilling, cable-tool drilling, production, and miscellaneous.

THE ARMY-NAVY "E" FOR THIS

On September 5th, 1942, our Mine and Mill at Climax, our Research Laboratory at Detroit and our Conversion Plant at Langeloth, Pennsylvania, were given the Army-Navy Production Award. Since then the award has been twice renewed. The two-starred flag we fly represents a full year of contribution to the war effort recognized by the Army and Navy.

Winning the award by the laboratory began in 1931. It was then that it was founded to meet our needs for authoritative information about molybdenum—containing ferrous materials.

Pearl Harbor intensified our work with producers of war equipment—work that is aided considerably by the accumulated data and experience gained in over ten years of concentrated research.

We are particularly proud to be among those companies whose laboratories are entitled to fly the Army-Navy "E".

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company

MOLY

500 Fifth Avenue · New York City

Now!

More than ever before you need valves that can "take it."

ORBIT VALVES

Orbit Wing Valve

ORBIT WING VALVE

This valve is especially designed for Wing Service. Made in 2" size only in both flanged and screwed ends. Opening through valve is 1⅛". Seats of cast Stellite J Metal.

YOUR ORBIT VALVES
will last for the duration. Meanwhile, if you have any questions regarding their care or maintenance, write us.

OIL WELL IMPROVEMENTS CO.

SINCE 1912

TULSA, OKLAHOMA

Men in the Industry's News

E. D. SMITH, assistant manager of the producing division of Magnolia Petroleum Company, has been elected a vice president and director in charge of production, it was announced by D. A. Little, president. Smith succeeded Mark J. McLaughlin, who retired as manager of production on January 1 upon the completion of 45½ years of continuous service in the drilling and producing branch of the oil industry, including 32 years with Magnolia Petroleum Company.

After working with South Penn Oil Company, Smith joined Magnolia Petroleum Company October 10, 1918, as production foreman at Augusta, Kansas, and a year later was moved to Oklahoma as superintendent at Cushing. He was elevated to division superintendent of Oklahoma on January 1, 1935, and became assistant manager of production with headquarters at Dallas, March 1, 1939.

McLaughlin began his career as a roustabout in West Virginia for South Penn Oil Company in July, 1898, and moved to Texas in January, 1912, to become district superintendent at Electra for Magnolia Petroleum Company, which was then launching its initial development program in North Texas. Two years later he was promoted to division superintendent, and in August, 1919, he became assistant manager of the producing division. He served as acting manager of production from January 1, 1931, until the retirement of Frank V. Faulkner in April, 1932. In the meantime, McLaughlin had been chosen a director and vice president.

Officials and veteran employees of the company presented McLaughlin with a wrist watch and Mrs. McLaughlin with a string of pearls at an appreciation dinner.

W. C. TROUT, president of Lufkin Foundry & Machine Company, Lufkin, Texas, has been reelected as regional director of the National Association of Manufacturers. Trout has been prominently engaged in the activities of the national and state manufacturers associations, having served as president of the state association for three successive terms, one year as chairman of the board, and is now serving as chairman of the executive committee.

T. L. (DICK) LEWIS has joined the Frick-Reid Supply Corporation, as district manager of tube sales, with headquarters at Houston. For the past 13 years he has been associated with Norvell-Wilder Supply Company, and was vice president at the time he severed that connection. Previously he was general sales manager for A. M. Byers Company, with headquarters in Pittsburgh.

JOHN A. HILL, Houston, representative for Catawissa Valve & Fittings Company, became the father of twin girls in late December.

P. F. HABERSTICK, district clerk for The Atlantic Refining Company, Kansas district, has been transferred to Lake Charles, Louisiana, where he will serve as field scout.

J. B. THOMPSON, purchasing agent for Shell Pipe Line Company at Houston, has been appointed assistant director of materials for PAW District 3. Educated as a mechanical engineer at the University of Illinois, Thompson joined the Shell organization at Wood River refinery over 18 years ago and has served Shell units in various capacities in the refining, production and transportation branches in the United States and in South America.

S. F. SHAW, consulting engineer of San Antonio, is spending the month of January in Calgary, Canada.

R. S. REED, JR., has been appointed manager of the recently established office of The McCarty Company, industrial advertising counsellors. For the past 12 years he has been advertising director of Pittsburgh Equitable Meter Company, Pittsburgh, Pennsylvania, and Merco Nordstrom Valve Company, of Pittsburgh, Pennsylvania, and Oakland, California. Opening of an office in Pittsburgh results from The McCarty Company's conviction that great post-war activity will center around Pittsburgh.

Advertisers' Index

***Indicates detailed information on products and services included in 1942 edition of Composite Catalog of Oil Field and Pipe-Line Equipment.**

Associated Engineers	60
*Baker Oil Tools, Inc.	44
Wm. M. Barret, Inc.	60
*Bowen Co. of Texas	34
*Brown Oil Tools, Inc.	34
Jo H. Cable	30
*Cardwell Manufacturing Co.	III Cover
*Climax Molybdenum Co.	63
Dedman Foundry & Machine Co.	61
DeWitt Hotels	52
Ft. Worth Laboratories	60
*The Goodyear Tire & Rubber Co.	1
Houston Laboratories	60
*Hughes Tool Co.	I Cover
*Larkin Packer Co.	27
A. M. Lockett & Co.	52
*The Lufkin Foundry & Machine Co.	6
*Mission Manufacturing Co.	38
*The National Supply Co.	28-29
*Oil City Brass Works	34
Oilfield Salvage Co.	61
*Oil Well Improvements Co.	64
*The Parkersburg Rig & Reel Co.	II Cover
*Patterson-Ballagh Corp.	49
*Pelican Well Tool & Supply Co.	51
Petroleum Electric Power Association	31
*Reed Roller Bit Co.	2-3
*Rollway Bearing Co.	4
Roosevelt Hotel	60
The H. M. Sawyer & Son Co.	61
South Texas School of Law	60
*Standco Brake Lining Co.	60
Sterling Packing & Gasket Co.	58
*Thornhill-Craver Co.	58
Treasury Department	33
Warner & Swasey Co.	8
Weatherford Spring Co.	30
*Wilson Manufacturing Co.	5
Wyatt Metal & Boiler Works	IV Cover